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TRINITY RIVER SUB-BASIN (TRINITY AND SAN JACINTO RIVERS AND COASTAL STREAMS)- REPORT ON WATER POLLUTION

Public Health Service
Dallas, Texas

January 1952

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Report on Water Pollution Control

1952

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FEDERAL SECURITY AGENCY
Public Health Service

REPORT ON
WATER POLLUTION

TRINITY RIVER SUB-BASIN

(Trinity and San Jacinto Rivers and Minor Coastal Streams)

January 1952

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FEDERAL SECURITY AGENCY
Public Health Service
U.S. Division of Water Pollution Control
Western Gulf and Colorado Drainage Basin Office

In Cooperation with
Texas State Department of Health

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INTRODUCTION

The subject of stream pollution has always received considerable attention in the State of Texas. However, pollution abatement has made outstanding progress since 1946, as a result of concentrated efforts by the water pollution control agencies, and of the concern expressed by public officials, professional and lay groups, and the general public. It is recognized that pollution prevention and abatement measures must be continued to protect the state's valuable water resources from damage and to encourage economic development, which is dependent on the water resources.

This report on the Trinity River Sub-Basin has been prepared as an aid in the continued development of the water pollution control program for protection of the waters of the basin. It is a summary of information and data that were available January 1952 on the uses to which the water resources were put, the pollution reaching the watercourses and the damages resulting from that pollution, the benefits which may result from pollution prevention measures in effect and those pollution prevention measures which were required.

The data presented herein bring together information collected by Federal, State and County agencies, municipalities and industries, and other interests concerned with the conservation and development of water resources. This report will serve to publicize the water pollution situation and direct the responsibility for needed corrective measures to municipalities and industries involved.

This report is also intended for use by the Public Health Service as a part of the nation-wide program. Provisions of the Federal Water Pollution Control Act, Public Law 845, passed by the 80th Congress, June 1948, requires the Surgeon General of the Public Health Service to cooperate with other Federal Agencies, with State and interstate water pollution control agencies, and with municipalities and industries in the preparation or adoption of comprehensive programs for eliminating or reducing the pollution of interstate water and tributaries thereof, and improving the sanitary condition of surface and underground waters.

It should be recognized that this report is based on data which were readily available January 1952 from various sources, and no investigations have been made specifically for this report. The data, therefore, are admittedly incomplete. The data contained in this report show the progress that has been made and indicate the work which still faces the State water pollution control agencies in carrying out the water pollution control program for the Trinity River-Sub-Basin.

Data and knowledge are sufficient to indicate the location and extent of the basin's remaining pollution problems. The list of pollution abatement projects which are included in Table L of this report represents those known to be needed January 1952. Further studies and evaluation may result in some changes in the estimated requirements.

ACKNOWLEDGEMENTS

The Public Health Service wishes to acknowledge the cooperation and assistance in the preparation of this report from:

- Texas State Department of Health
- Texas Game and Fish Commission
- Texas Railroad Commission
- Texas Board of Water Engineers
- Galveston County Pollution Survey
- Harris County Commissioners Court

The Public Health Service also wishes to acknowledge valuable assistance rendered by:

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  - Dallas
  - Tarrant
  - Harris
  - Galveston

- City Health Departments of
  - Dallas
  - Fort Worth
  - Houston

Federal agencies from which assistance was obtained include:

- Department of the Army
  - Corps of Engineers

- Department of the Interior
  - Geological Survey
  - Fish and Wildlife Service

- Department of Commerce
  - Bureau of the Census
  - Weather Bureau

- Federal Power Commission

- National Resources Committee

Other valuable sources of information include:

- The Texas Almanac,
  published by the Dallas Morning News

- Directory of Texas Manufacturers,
  published by the Bureau of Business Research,
  University of Texas

SUMMARY

The Trinity River Sub-Basin located entirely within Texas includes the watersheds of the Trinity and San Jacinto Rivers and minor coastal streams. It is situated in eastern Texas and extends from a few miles south of the Oklahoma-Texas boundary to the Gulf of Mexico. The basin is roughly 70 miles wide, 350 miles long and contains an area of about 21,000 square miles.

This watershed, with a population of 2,400,000 is the most densely populated sub-basin of the Western Gulf Drainage Basin. Although it has only 7 percent of the land area, 32 percent of the people living in the Western Gulf Drainage Basin reside in this sub-basin. The Trinity River Sub-Basin is rural in character except for two major manufacturing, distributing and economic areas. One, comprising Dallas and Tarrant counties, is situated in the upper part of the basin. The other, including Harris and Galveston counties, is a coastal area in the extreme southern portion of the basin. These two areas are experiencing rapid population increases but the population in rural areas is static.

The oil fields and mineral deposits of the basin supply petroleum, salt, and sulfur to a vast and growing petroleum processing and chemical industry in the Houston-Galveston area. Harris and Galveston counties produced 40 million barrels of oil in 1948 and five adjoining counties produced 105 million barrels.

The Trinity River Sub-Basin is in a period of rapid economic expansion. The industrial areas discussed above have become two of the leading manufacturing centers in the Southwest. Dallas with well over 1,000 industrial establishments ranks high in clothing manufacturing and Fort Worth is one of the nation's foremost livestock and meat packing centers. The increase in the number of chemical industries in the Galveston-Houston area can only be described as phenomenal, and they are still expending in size and numbers. The Houston Deep Water Port is second only to New York in volume of tonnage handled.

Average daily water demands in the basin approximate 650 million gallons. Municipalities use about 200 million gallons per day, industry requires another 180 million gallons, and irrigation draws upon the basin's water resources to the extent of 270 million gallons per day. During the 130 day irrigation season the agricultural demand is at least three times the yearly average and the total water use in the basin during that period is over 1.2 billion gallons per day. Other major water uses include navigation, bathing, recreation, hunting, and sport and commercial fishing.

The water resources of the basin are considered adequate for all present needs. Stream flows vary over wide ranges and at times the flow in some parts of the basin is entirely insufficient to satisfy present demands. Ground water is adequate, but in some highly developed areas the water table has been lowered several hundred feet. The degree to which these water resources may be stored, conserved, and distributed when needed, will be a major factor in the economic expansion of the basin.

In January 1952, 114 municipalities and over 425 industries were using the basin waters for final disposal of their waste. The municipalities treated wastes from about 1,600,000 people and from several hundred industries connected to community sewer systems. The treatment provided by these municipalities removed over 80 percent of the pollution and the wastes being discharged were estimated to be equivalent to that from only about 364,000 people.

Approximately 180 industrial plants discharged organic wastes to the basin's waters. Eighty-four of these plants have an estimated combined pollution load equivalent to that of over 500,000 people. The pollution load contributed by the other plants discharging organic wastes was not determined. Ninety-one industries were discharging inorganic wastes and the type of waste from 23 plants was not determined.

Two hundred and one salt water injection wells were placed in operation in the years 1947 through 1951. Oil brought to the surface is generally mixed with salt water which must be removed before the oil can be used. This salt water would pollute the surface waters if discharged into them. For this reason the salt water is forced back underground into salt water strata through injection wells. These wells in the Trinity basin are used to dispose of approximately 12 million gallons per day (over 4 billion gallons annually). Data on the many injection wells constructed prior to 1947 were not readily available and the limited time and personnel did not permit extracting these data from the old records.

There were 154 municipal sewage treatment plants and 404 industrial waste and sewage treatment plants operating in the basin. Seventy-nine of the municipal and 252 of the industrial plants had satisfactory capacity. The capacity of 74 municipal plants and 64 industrial plants was inadequate. The adequacy of treatment facilities provided at one municipality and at 88 of the industrial sources of pollution was unknown.

Seventy-one municipal sewage treatment plants were constructed, replaced, or enlarged during the six year period 1946 through 1951. Most of this construction was for replacement or enlargement of existing plants that had been outgrown by the communities they served. Several plants were constructed by communities also constructing their first public sewer system.

It was estimated that control of pollution from municipalities would require the construction of 3 new plants, the enlargement of or addition to 50 plants, and the complete replacement of 23 others.

It was estimated that the construction of the municipal treatment facilities which the Texas State Department of Health considered necessary to correct sewage pollution in the basin would cost about $10,060,000.

Known requirements for controlling pollution caused by industrial wastes consist of the construction of 4 new plants, the enlargement or addition to 24 plants and the complete replacement of 2 other plants. Twenty-four industrial plants treating sewage need additions or enlargements and 4 plants need replacement. Three industrial plants should connect their waste sewers to municipal sewer systems.

An extensive pollution survey revealed areas in Galveston County where the waters were being polluted by municipal and industrial wastes. The pollution control agencies are now actively engaged in correcting this condition.

CONCLUSIONS

1. Water resources in the Trinity River Sub-Basin are important to the continued development of the area. Full usage of these resources for domestic, industrial and agricultural purposes, commercial and sport fishing, recreation, navigation, and wildlife is dependent upon the continued control of pollution now entering the waters as well as the control of future sources of pollution.

2. An average of 650 million gallons of water are used each day in the basin. During the irrigation season the use exceeds a billion gallons per day. Present use requires the entire low river flow. Demands for ground water in the two industrial areas has lowered the water tables but ground water resources can be expanded through proper spacing of wells and corrective measures as to withdrawal rates in some sections.

3. Information was somewhat limited on industrial wastes discharged from separate outfalls. However, the data and knowledge available are sufficient to indicate corrective action needed on many pollution problems.

4. Pollution was severe in the lower sections of the basin particularly in Harris and Galveston counties; however, active pollution abatement programs are underway. Pollution was reported to be creating a local nuisance immediately below the sewer outfall of several communities.

5. The major sources of pollution in the basin were the wastes discharged by municipalities, chemical and petroleum processing industries, oil production operations, and the silt eroded from agricultural land.

6. Over 1.6 million people were served by sewerage systems and all but 86,000 of these were also served by sewage treatment facilities. Primary treatment plants were operated by 38 municipalities serving about 64,000 people while 74 communities treated the wastes of 1.5 million people in secondary sewage treatment plants.

7. The pollutional load contributed by the municipalities was reduced to approximately 364,000 population equivalent by treatment works. Organic industrial wastes estimated to have a population equivalent of more than one-half million persons were also entering the basin's waters. Organic wastes from 113 industries, and inorganic wastes from 292 industries was also being discharged, but detailed information on volumes, strength and effects on the waters had not been ascertained. The larger portion of these wastes are discharged to tidal water.

8. Twelve million gallons of oil field salt water waste were being disposed of daily through the 201 salt water injection wells for which data were available. There are numerous salt water holding pits remaining in the basin which are a potential source of pollution.

9. Principal pollutional damages which may occur in the basin waters include impairment of present and future water supplies, destruction of oyster beds by silt, and the contamination of oysters by sewage, interference with full development of fishery resources, destruction of recreational areas, contamination of bathing waters, decrease in property values, increased chlorides in rice irrigation water.

10. Plans are going forward under the Texas State Department of Health's program for the construction of many municipal sewage treatment plants and plant additions. Considerable activity was also apparent in the industrial waste pollution control field.

11. The anti-pollution program of the Texas State Department of Health is well under way. The program depends to a great extent upon education and voluntary cooperation of municipalities and industries, but in extreme cases legal action has been brought against polluters. The program is backed by statutes and has the cooperation of other State agencies concerned with the development and reclamation of the State's water resources.

RECOMMENDATIONS

It is recommended that:

1. Municipalities and industries assume their responsibilities for restoring and preserving the waters of the basin essential for the maximum development of the basin's resources and initiate pollution abatement programs and construction of waste treatment facilities now known to be required.

2. Adequate treatment of sewage be provided by the municipalities in accordance with the recommendations of the Texas State Department of Health as follows:

(a) The new sewage treatment plant now under construction at Texas City be completed as rapidly as possible and that Galveston, which is planning to construct a sewage treatment plant in the near future, start construction soon.

(b) New sewer system and treatment plant be constructed at Houston Water Conservation and Improvement District #21. This sewerage system was under construction.

(c) Existing treatment plants be enlarged or additional treatment facilities be provided at the following communities, may of which were actively engaged in improving their facilities as indicated:

Alvin	Act. Planning
Baytown(Baytown Plant)	Act. Planning
Baytown(Goose Creek Plant)	Act. Planning
Baytown (Morrell Park Plant)	Act. Planning
Blooming Grove	
Bridgeport	Act. Planning
Carrollton	
Celina	
Coolidge	
Corsicana (Plant #2)	Plans Approved
Dallas	Under Const.
Dickinson	Act. Planning
Elkhart	
Fort Worth	Under Const.
Frisco	
Gainsville	Under Const.
Galena Park	Under Const.
Garland	Act. Planning
Grand Prairie	Under Const.
Grapeland	
Grandview	
Houston (Simms Bayou)	Act. Planning
Humble	Act. Planning
Kaufman	
Kemp	
La Marque	Plans Approved
La Porte	Under Const.
Leonard	
Lewisville	Under Const.
Lovelady	
Maybank	
McKinney (Plant No. 1	
McKinney (Plant No. 2)	
Madisonville	
Malone	
Midlothian	

Milford	
Muenster	
Palmer	
Pasadena	Act. Planning
Rockwall	
Saint Jo	
Sanger	Act. Planning
Seagoville	
Terrell	Act. Planning
Texas City Heights	Act. Planning
Tioga	Act. Planning
Trinity	Act. Planning
Venus	

(d) The following communities replace their existing plants with adequate treatment plants:

Athens	Act. Planning
Baytown (Pelly Plant)	Act. Planning
Dayton	Under Const.
Farmersville	
Ferris	
Frost	
Grapevine	Act. Planning
Groveton	
Handley (Fort Worth	
Highlands	Under Const.
Hubbard	
Italy	
Kerens	
Liberty	
Mansfield	Act. Planning
Mesquite	Act. Planning
Mexia	
Oakwood	
South Houston	Act. Planning
South Side Place	Act. Planning
Van Alstyne	
Weatherford	
Wortham	
Wylie	

(e) The following communities abandon the listed plants and treat their sewage in other plants now existing or to be constructed. All but Garden Villas are making active plans for abandoning their plants.

Houston (Magnolia)
Houston (Garden Villas)
Houston (Clinton Park)
Houston (Oak Forest)
Houston (South Park)
Houston (Manchester)

3. Adequate treatment be provided for industrial wastes and where such wastes deleteriously affect legitimate uses of the water and that such treatment conform with state anti-stream pollution statutes and regulations.

4. Municipal and industrial waste treatment plant maintenance and operation be sustained at a high level so that maximum returns may be realized from construction investments.

5. The facilities of the control agencies having State water pollution functions be expanded commencerate with the importance of the conservation of this valuable natural resource.

6. Soil conservation programs be expanded to keep valuable top soil on the land where it belongs and out of the streams where it causes considerable pollution damage.

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HISTORICAL BACKGROUND

In 1528, the Spaniard, Cabeza de Vaca, was shipwrecked near the mouth of the river. Over two hundred years later in a 15 year period following 1756, the Spanish colony of Atascosita was founded, developed, and abandoned near the present site of Liberty. This community and a second one near the present site of Trinity were established to discourage the French trade with the Indians.

Galveston Island at the mouth of the Trinity was used as a base in 1816 by the privateer Luis Aury. He was displaced in 1817 by the pirate Jean La Fitte who was ousted by the U. S. Navy in 1821. Point Bolivar at the mouth of the river was used by Dr. James Long and his followers from 1819 to 1821 as the base of operations in their futile attempt to capture Texas from the Spanish.

James White, one of the early Anglo-American colonists and founders of the Texas ranching industry, brought in cattle and increased the native herds which were descendants of cattle released from the abandoned Spanish colonies. Important factors that contributed to the expansion of the cattle industry of the West were the invention of barbed wire and the windmill and the construction of railroads.

Anahuac, at the mouth of the Trinity, was the scene of the first conflict in 1832 between the Anglo-American settlers and the Mexican authorities who had supplanted the Spanish. Subsequent troubles in this area led to the Texas War of Independence, the concluding battle being fought in 1836 on the banks of the San Jacinto River of this basin. This battle is considered to be the 16th most important battle fought in history, deciding the future ownership of most of the present western territory of the United States.

The discovery in 1894 of the first important oil field in Texas was the result of an accident, when the town of Corsicana was drilling a well for a municipal water supply. The drillers, annoyed by the oil, cased it off and continued drilling to a warm artesian aquifer below the oil stratum. The discovery of this oil field started a boom that resulted in 57 producing wells by 1897. By 1948, 32 of the 43 counties located entirely or partly within the basin were producing or had produced oil. The first Texas oil refinery was located at Corsicana.

The Trinity River Sub-Basin contains the cities of Houston, Dallas, and Fort Worth, three of the four largest cities of the State. Houston, the largest, is an inland port city and has developed from a commercial center for the agricultural area in the lower part of the basin to the largest industrial and commercial center in the southwest. Dallas has grown in population from an original settler in 1841 to the second largest city, due largely to ample water supply and good geographical location. Fort Worth was originally an Indian fort, later a station on the historic Chisholm Cattle Trail and finally a terminal for the first out-of-state railroad. The railroad enabled Fort Worth to become an important cattle loading center and today it is the principal meat packing and flour mill center in the southwest.

PHYSICAL DESCRIPTION

The Trinity River Sub-Basin lies in the eastern half of Texas and is an area about 70 miles wide extending from the northern part of Texas in a general southeasterly direction about 350 miles to Galveston Bay. It is situated entirely in the State of Texas and is bounded on the north by the watershed of the Red River; on the east by the watersheds of the Sabine and Neches Rivers; on the west by the watershed of the Brazos River; and on the south by the Gulf of Mexico. The total drainage area in the basin is approximately 21,000 square miles of which about 18,000 lie in the Trinity watershed and 3000 in the San Jacinto watershed. The principal tributaries of the Trinity drain a fan-shaped hilly area and converge to form the main stem near Dallas where the general character of the terrain changes to gentle sloping hills. The Trinity is a turbid, meandering stream of flat gradient. Its tributaries are faster flowing streams dropping rapidly from their headwaters. The river rises at an elevation of about 1250 feet, seven hundred miles from the mouth, drops rapidly for two hundred miles to about 400 feet at Dallas and discharges at sea level into Galveston Bay. The San Jacinto River Basin lies in the coastal plain. It rises at an elevation of about 400 feet and discharges into Galveston Bay at sea level not far from the mouth of the Trinity.

Eight large reservoirs have been constructed in the basin and four others are now under construction. These reservoirs, primarily for flood control and water supply, will provide over 3,000,000 acre-feet of storage.

MAJOR RESERVOIRS IN TRINITY BASIN

Name of Reservoir	Stream	Surface Area Acres	Storage Acre-Feet
Existing Reservoirs			
Bridgeport	West Fork Trinity	10,200	291,000
Eagle Mountain	West Fork Trinity	9,600	214,000
Lake Worth	West Fork Trinity	3,800	21,800
Lake Dallas	Elm Fork Trinity	10,900	194,000
White Rock Lake	White Rock Creek		18,200
Mountain Creek	Mountain Creek	390	30,200
Barker	Buffalo Bayou	15,000	171,100
Addicks	South Mayde & Bear Cks.	16,600	201,100
Reservoirs under Construction			
Benbrook	Clear Fork	7,600	258,700
Grapevine	Denton Creek	12,700	434,200
Garza-Little Elm	Elm Fork Trinity	38,900	1,016,200
Lavon	East Fork Trinity	20,100	423,400

Note: The Garza-Little Elm reservoir will flood and include Lake Dallas.

The climate of the basin is characterized by its diversity and sudden changes varying from dry sub-humid in the upper portion to humid in the lower portion. The entire area is subject to extremely heavy rainstorms and the gulf area is occasionally battered by hurricanes. The maximum 24 hour rainfall on record is 15.87 inches and rainfalls of 8 to 9 inches in 24 hours occasionally occur. The average temperatures in the upper portion of the basin vary from 42 in winter to 85 in the summer. Average temperature in the lower portion vary from 54 in the winter to 83 in the summer. Precipitation varies from 28 inches per year at the headwaters to 45 inches at the Gulf. The growing season differs by 112 days between the upper and lower areas of the basin, the average seasons being 229 and 341 days, respectively.

Light snowfalls occur occasionally in the northern portion and rarely in the gulf area. Evaporation is 58 inches per year in the upper portion while in the humid gulf area it amounts to 46 inches per year. This high evaporation rate has a marked effect on planning water use and designing storage projects.

Stream flows vary from year to year and also markedly from season to season. Periods of zero flows have been experienced at all the gaging stations on the tributaries of the Trinity River. Zero flows have also been recorded at all stations on the main stream (West Fork) above and including Dallas, except at the gaging station at Grand Prairie. The minimum observed flow at this station was

3.2 second-feet, June 6, 1925. This does not represent natural low-water flow, because the city of Fort Worth releases a considerable flow of sewage which augments the natural flow of the West Fork.

The maximum flood on the Trinity River occurred in 1908. The maximum discharge at Dallas was 184,000 second-feet. Progressing downstream it decreased to 164,000 at Long Lake, 100,000 at Riverside. The decrease in the rate of discharge as this flood progressed downstream is characteristic of all major floods on the Trinity River and is attributable to the natural controls in the river, and to the immense valley storage between the controlling points.

The average Trinity River flow is 1,570 cubic feet per second at Dallas and 8,140 at Romayor. The most critical stream flows on the Trinity occur in July, August, and September, when average monthly flows at Dallas have been as low as 2 second-feet and average monthly flows at Romayor 160 second-feet. The completion and proper operation of the many reservoirs on the headwater streams will do much toward equalizing stream flow. Increased low flows in the stream below Fort Worth and Dallas will provide additional dilution water for the sewage plant effluent from these cities.

The most critical stream flows on the San Jacinto occur in August, September, and October which is one month later than they occur on the Trinity. The minimum flow of the San Jacinto River at Huffman was 49 second-feet. This occurred in September 1940. Two months later, November 26, 1940, the maximum recorded flood of 253,000 second-feet rolled down the watershed.

The percentage of the rainfall that appears as runoff is rather small. About 7 inches of the average annual rainfall in the basin appears in the streams. Departures from this average have been extreme. Runoff as low as 0.72 of an inch and as high as 13.37 inches have been recorded by the gaging station at Romayor during the 1925-50 period of record used for the above data.

Although in some states knowledge of stream flows is of value in determining pollution abatement measures necessary to economically protect legitimate water uses, in Texas, interpretation of anti-pollution statutes by the courts have been such as to establish a policy requiring complete treatment of wastes regardless of the volume of receiving waters. Present stream gaging coverage is considered sufficient to establish general basin hydrology. As flow data are not used for pollution control purposes the cost of installing additional gaging stations cannot be justified solely on this basis.

The Trinity River Sub-Basin lies within two physiographic provinces - the Northwestern portion of the basin is situated in the central lowland province of the Interior Plains and the remainder of the basin is in the West Gulf Coastal Plain. In the central lowland area, erosion is well advanced and the streams are entrenched. Farther toward the Gulf the stream development is progressively less mature. There are occasional escarpments defined by the more resistant geologic formations, but there are no marked features of relief on the watershed.

The outcrops of rock formations include those of the following geologic ages: the Pennsylvanian, the Upper and Lower Cretaceous, the Eocene, the Miocene, the Pliocene and the Pleistocene. The larger stream valleys contain deposits of alluvium belonging to the Quaternary period. The Pennsylvanian formations crop out in the northwest corner of the watershed and dip to the northwest. The other formations all dip to the southeast. The basin crosses the geological formations of the area at approximately right angles so there is a great variation in surface geology from the headwaters to the mouth.

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ECONOMIC DEVELOPMENT

Natural Resources

The basin is rich in natural resources, not the least of which are its surface and underground waters. There is an ample supply of surface water in the basin for present use but rainfall and runoff are very erratic and water is not always available at the time it is needed. Present use requires the entire low river flow. The basin is also well supplied with ground water, having over a dozen water-bearing formations all producing good water. Ground water use has been increasing rapidly and there are indications that economic production limits have been reached in some areas. Salt water intrusion is becoming a major threat to ground water supplies at Galveston. Further agriculture and industrial expansion of the basin will be governed, to a large extent, by the development of surface water storage facilities to retain flood waters for use during low flow periods.

The rich soil of the basin is one of its major resources. There are eight distinct types of soil and these lead to and support a diversified agriculture. Rainfall has been sufficient for most of the crops grown in the basin with the exception of rice. The soils in the Gulf area are ideal for rice cultivation which can be practiced only by use of supplementary water secured from the Trinity and Brazos Rivers. In many placed unwise clearing, pasturing, and tillage practices have caused serious loss of the rich top soil by water erosion.

About 25 percent of the basin area is forest. Principal species of commercial timber are short leaf and loblolly pine, gum, ash, red oak, pin oak, post oak, hickory and pecan. Most of the virgin timber has been harvested but second growth pine is now being used for timber and pulp wood.

The basin contains extensive and diversified mineral resources. Oil and gas is present in most of the counties of the basin and producing fields are located in about half of them. Production of oil and gas is, at present, concentrated in the central and gulf areas. Bituminous coal, lignite, sulphur, iron ore, salt, fullers earth, bentonite, clays, limestone, sand and gravel are also found in the basin.

Another important resource of the basin is the natural and man-made recreational areas which are now being patronized by many hundred thousand people annually.

Population Trends and Distribution

The population living within the Trinity River Sub-Basin in 1950 totaled about 2,400,000 of which 1,728,000 (72%) resided in urban communities and 672,000 (28%) in rural areas. The upper and lower portions of the basin are predominantly urban while the central portion is rural.

The basin is the most densely populated sub-basin of the Western Gulf Drainage Basin. Thirty-two percent of the Western Gulf Basin's population reside in the Trinity River sub-basin which has only about 7 percent of the area. It contains only 8.8 percent of the land area of Texas but has 31 percent of the total state population. The three largest cities in the basin are Houston, Dallas, and Fort Worth with populations of 594,000, 433,000 and 277,000 respectively.

Between 1930 and 1940 the basin population increased 18 percent and in the 1940 to 1950 decade the population increased 32 percent. The basin, excluding the urban areas, (Dallas, Tarrant, Harris, and Galveston Counties) experienced a population decrease of slightly less than one percent from 1930 to 1940 and a 10 percent decrease between 1940 and 1950. The population of the four urban counties listed above increased 57 percent from 1940 to 1950. This population growth was accompanied by industrial development in the Fort Worth-Dallas, and the Houston-Galveston areas. Further marked population increases in these areas are indicated by the continuing rapid industrial expansion.

Additional information on population trends and distribution is given in appendix "B".

Agricultural Development

The farm area of the basin approximates 9 million acres and comprises about 60 percent of the total area. About 3.5 million acres of this farm land are under cultivation, the balance being used for pasture, woodland and other purposes. In the past few years the general trend in the gulf area has been toward the abandonment of cultivation with the land reverting to forests. The principal crops are cotton, corn, wheat, oats, sorghums, rice, potatoes, hay, and barley. Production of cotton and corn is general throughout the basin. The bulk of these crops are produced in the Blackland Prairie area of the northern section. Wheat is grown in the northern part only. Oats are raised as a grain in the northern and for pasture and hay in the southern areas. The flat land of the coastal section is easily adapted to rice culture and extensive rice farming has been carried on for years in Chambers and Liberty Counties. Approximately 45,000 acres of rice land are irrigated with water pumped from the Trinity River. In addition to the staple crops listed above, the basin produces large quantities of vegetables, peanuts, melons, grapes, and fruits.

This basin is also an important livestock-producing area. The larger ranches are located in the northwest and extreme southern portions of the watershed, although considerable livestock production occurs throughout the basin. Dairying and poultry raising are also important agricultural pursuits.

Industrial Development

Lumbering was the first major industry in the watershed. It is now comparatively inactive as most of the original commercial timber has been harvested, leaving only second-growth timber available. Adoption of good forestry practices within recent years is increasing timber yields and assures a bright future for the lumber industry of the basin.

Several producing oil fields, in the basin and in the adjacent area, supply crude oil for the many refineries operating within the basin. The production of oil in the watershed dates back to 1894 when oil was discovered at Corsicana which is also the site of the state's first oil refinery, built in 1898. More than 235 well defined oil fields are located in the watershed. In addition, there are several areas where producing oil wells are too scattered to permit designation as an oil field. There are several gas fields in the basin, but gas production is not sufficient to supply the needs of the basin's industries and gas must be imported from other areas of Texas.

Bituminous coal was once mined near the town of Bridgeport from beds about 18 to 22 inches thick. This was a low grade coal with high sulphur and ash content. Coal has not been mined for several years because oil and gas from nearby fields provide an abundant supply of high grade fuels. Some lignite is being mined for local use from large deposits of fair-to-good grade lignite in beds varying in thickness up to 15 feet.

Manufacturing, except in the larger cities, is in general, limited to processing raw materials from farms, forests, and mineral deposits. Practically every community in the middle and upper portions of the basin has a cotton gin, and in the forested area of the lower watershed each of the larger towns has one or more sawmills. The types of small manufacturing establishments found outside the larger cities are creameries, cottonseed oil mills, oil refineries, canning plants, mattress factories, box factories, brick plants and local service establishments such as printing shops, machine shops, ice plants, garages, and lumber yards. The two industrial areas, Dallas-Fort Worth and Houston-Galveston, have led in developing the Trinity River sub-basin into the industrial center of the Southwest. These rapidly growing manufacturing centers contain almost every type of industry. A better understanding of the magnitude of the basin's industrial development can be obtained from Appendix D which lists several of the products made.

The city of Dallas is one of the foremost commercial and financial centers in the Southwest and leads the nation, on a per capita basis, in the distribution of consumer goods to retailers. It is the nation's leading spot cotton market with the Dallas Cotton Exchange handling millions of bales annually. Dallas ranks near the top as a clothing manufacturing center. Fort Worth, one of the most important livestock marketing and meat packing points in the United States, has livestock receipts approximating 5,000,000 head annually.

The oil fields and mineral deposits supply petroleum, salt and sulphur, and other minerals, to a vast and growing petroleum processing and chemical industry in the Houston-Galveston area. Harris and Galveston Counties, where these industries are located, produced over 40 million barrels of oil in 1948. This was supplemented by 105 million barrels of oil produced in five adjoining counties during the same year. Much of this petroleum was processed in the basin and almost all of it was handled, either as crude oil or refined petroleum products, by Port Houston shipping facilities.

Recreation, Fish and Game

Although not directly related to the resources of the Trinity River Sub-basin, the Galveston area constitutes an economical center for the landing, trans-shipping, freezing, and canning of marine fishes and shrimp taken from the Gulf of Mexico. During the period between September 1, 1947, and August 31, 1948, over one million pounds of sea fishes and six million pounds of shrimp were handled or processed in the Galveston area.

Recreational assets of the basin include the Gulf coast and the many reservoirs, forests and scenic areas. Parts of the Davy Crockett and San Jacinto districts of the Sam Houston National Forest are located in the basin. There are nine large and several small reservoirs now in the basin or under construction. The nine large reservoirs have a surface area totaling about 90,000 acres. Fishing is reported to be good in many of the reservoirs of the basin and in the Gulf of Mexico, but generally poor in the streams. Black and white bass, catfish, drum and various sunfishes constitute the varieties of fresh-water game fish sought by man. A variety of salt water fishes are caught in the Gulf and bays. The Texas Game and Fish Commission operates a large fish hatchery (1949 output-2,173,066) below Lake Dallas in the Elm Fork, Trinity River. A second hatchery (1949 output-1,803,776) is located near Huntsville.

Game and fur bearing animals found in the basin include squirrel, fox, raccoon, muskrat, rabbit, mink, opossum, skunk, weasel, and some white tailed deer. Game birds include quail, dove, and migratory waterfowl.

Galveston is the recreational center of the Gulf coast area of the basin. The Galveston Chamber of Commerce estimates that forty cents of every dollar spent in that city is in connection with resort or recreational activities.

Transportation

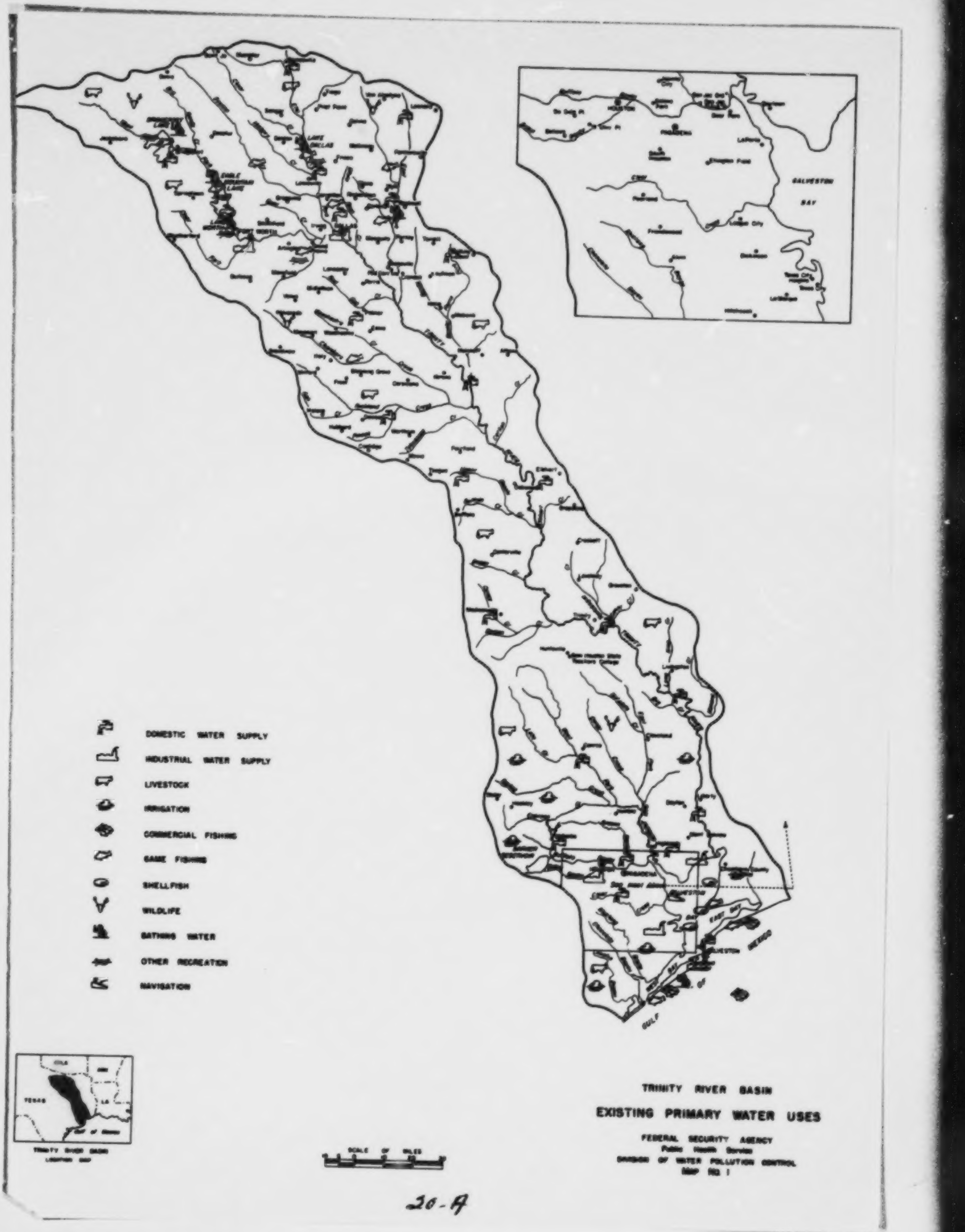
The Houston Ship Channel provides deep-water navigation for a distance of 50 miles from Gulf of Mexico to the Turning Basin not far from the heart of Houston. Port Houston is second only to the Port of New York in volume of tonnage handled. Cargo moved over the Houston Ship Channel totaled over 42,000,000 short tons in 1950.

A network of excellent railroads, highways, air lines, bus lines, and pipe lines serve the watershed. Railroad facilities are offered by eleven main railroads. Dallas, Fort Worth, and Houston are served by nine commercial air lines. Thirty-three towns in the basin have airports listed as class I or better, nine have class II ports, seven class III, five class IV, one class V, and one class VI.

Power

There are 69 power plant installations in the basin with a total generating capacity of about 1,120,000 kw. Thirty-three of these use internal combustion engines and thirty-six use steam engines for generating power. Approximately 200,000 kw are generated by industries for their own use. Public utility power plants are located in 23 municipalities and private industrial power plants in twelve.

The Federal Power Commission, Fort Worth, Texas, who supplied the above information, reports no known instance where water pollution has affected the operation of the plants or was a factor in the selection of a power plant site.


DOMESTIC WATER SUPPLY
INDUSTRIAL WATER SUPPLY
LIVESTOCK
IRRIGATION
COMMERCIAL FISHING
GAME FISHING
SHELLFISH
WILDLIFE
BATHING WATER
OTHER RECREATION
NAVIGATION
GALVESTON BAY
GULF
TEXAS
LA.
TRINITY RIVER BASIN
LOCATION MAP
SCALE OF MILES

TRINITY RIVER BASIN

EXISTING PRIMARY WATER USES

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
Map No. 1

20-A

USE OF WATER RESOURCES

Surface and ground water are both extensively used for municipal and industrial supplies and for irrigation. Appendix E is a tabulation of the known water supplies in the basin giving the source of the water and daily amount used for each supply. Map No. 1 is a graphic presentation of the existing primary water uses in the Trinity River Sub-Basin.

The Texas Board of Water Engineers reported diversions from the Trinity, San Jacinto and Brazos Rivers to the Houston regions during 1949 to average 467 million gallons per day, and the upstream diversions to average 332 million. The amount was not reported separately for the individual rivers.

Domestic Use

Ninety percent of the municipalities secure water from underground sources while ten percent rely on surface supplies or a combination of surface and underground supplies.

Approximately 1,030,000 people in 158 communities are supplied with over 102 million gallons of well water per day. Twenty communities with a combined population of 835,000 use an average of about 95 million gallons of surface water per day. The latter includes about 425,000 people in communities which use both surface and ground water but get most of their water from surface streams.

Houston is the largest city in the nation whose municipal supply is obtained exclusively from ground water. The city's present rate of withdrawal is 75 million gallons per day. Houston estimates its 1970 demand to be 213 million gallons per day. It is considering the development of a surface water supply on the San Jacinto watershed for much of the additional which will be needed.

The most vital and important use of water is for domestic purposes. Public water supplies may be adversely affected by pollution and the earliest pollution laws were enacted to protect such supplies. The large number of people dependent upon the waters of the Trinity River Sub-Basin makes it mandatory that pollution of these waters be kept at a minimum to protect the health and welfare of these people.

Industrial Use

Industries use large quantities of water. For instance, oil refining, one of the major industrial activities of the basin, requires 3,000 gallons of water for each barrel of oil processed and sulphur mining, another important industry in the basin, needs 8,000 gallons for each ton of sulphur brought to the surface. Industrial use of water from wells is exceptionally large and is possible because of the productiveness of the deeply buried water-bearing sands. The rapid industrial growth of the basin has, in part, been accelerated because ground water is readily accessible and new industries have not had to construct pipe lines or treatment plants to obtain water.

The use of water from the streams for industrial purposes has increased rapidly in recent years. Surface water appropriation of about 30,000,000 gallons per day have been granted to industry in the basin by the Texas Board of Water Engineers. Surface water use must increase as the basin continues to be industrialized.

The Texas Board of Water Engineers reports ground water use by industries in 1949 amounted to 18.6 million gallons per day in Houston, 60 million gallons a day at Pasadena, 17.9 million gallons a day at La Porte and Baytown, 14 million gallons a day at Texas City and 22.1 million gallons a day at various other locations in the Houston area making a total ground water use in the lower basin area of about 133 million gallons per day. Ground water temperatures range from 70 to 103 degrees Fahrenheit depending upon the depth of the well. Figure 1 shows the relation of temperature and mineral content of ground water to depth in the Houston area. Industrial use of ground water in the rest of the basin has not been accurately determined.

Industries suffer if their water supply is polluted. Pretreatment becomes necessary in some instances, adding greatly to the cost. Silt and sediment are damaging to nearly every industrial use of water. Chemical contamination may be damaging to boiler tubes, condensors, and other machinery. Continued and increased vigilance will be necessary to prevent pollution from becoming an economic burden to industry and to insure satisfactory industrial water supplies.

Agricultural Use

Rice irrigation requires about three hundred thousand to one million gallons of water, or, one to about three acre-feet of water per acre. Other crops and grasses are estimated to use two acre-feet of water per acre of land. Irrigation in the basin uses a yearly average of about 160 million gallons of surface water and about 113 million gallons of ground water per day. Irrigation is practiced fo[illegible]riod of about 130 days of the year. The actual demand during that period is

Prepared cooperatively by the United States Geological Survey and the Texas Board of Water Engineers

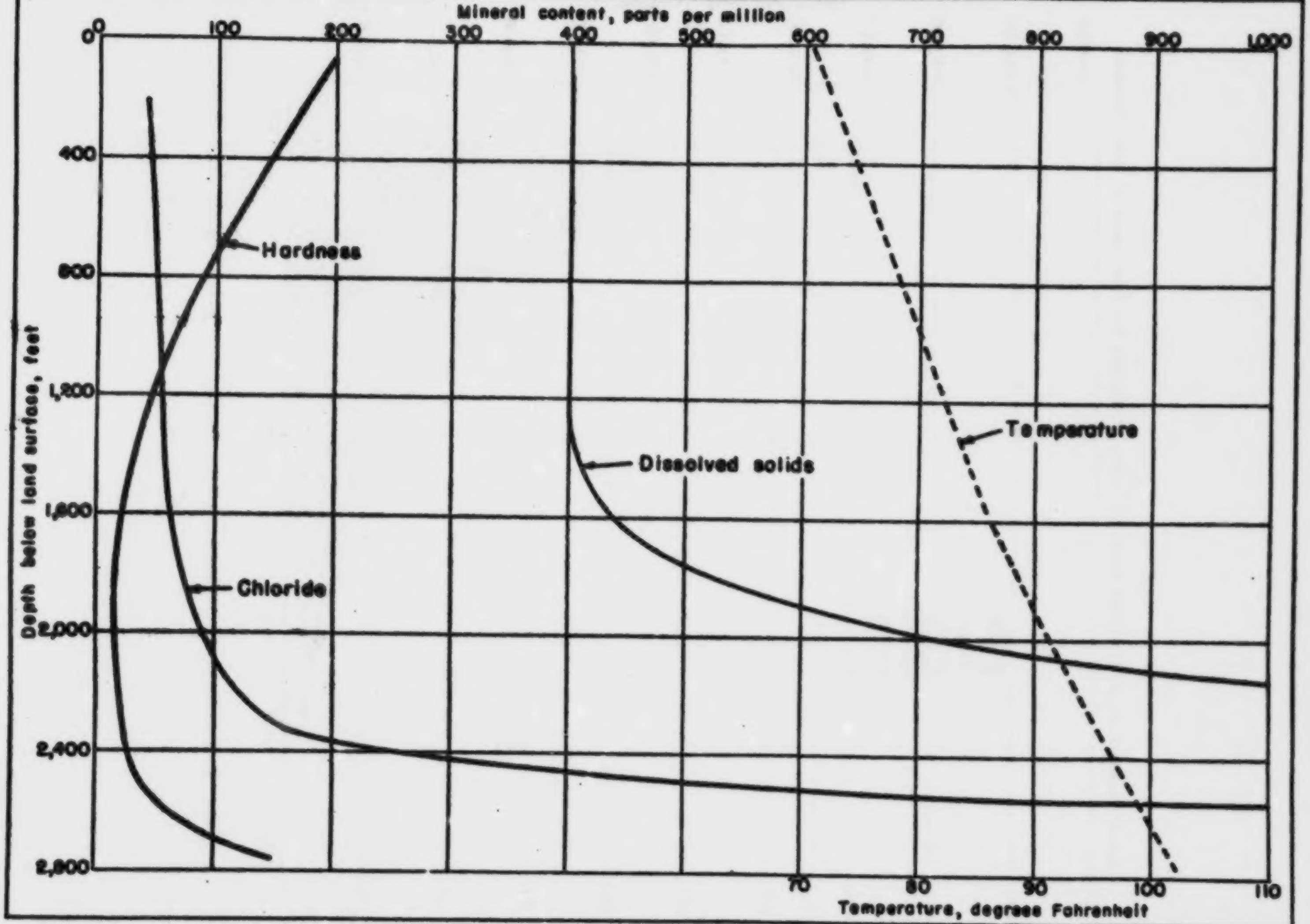


FIGURE 1.—Generalized relation of temperature and mineral content of ground water to depth in Houston area.

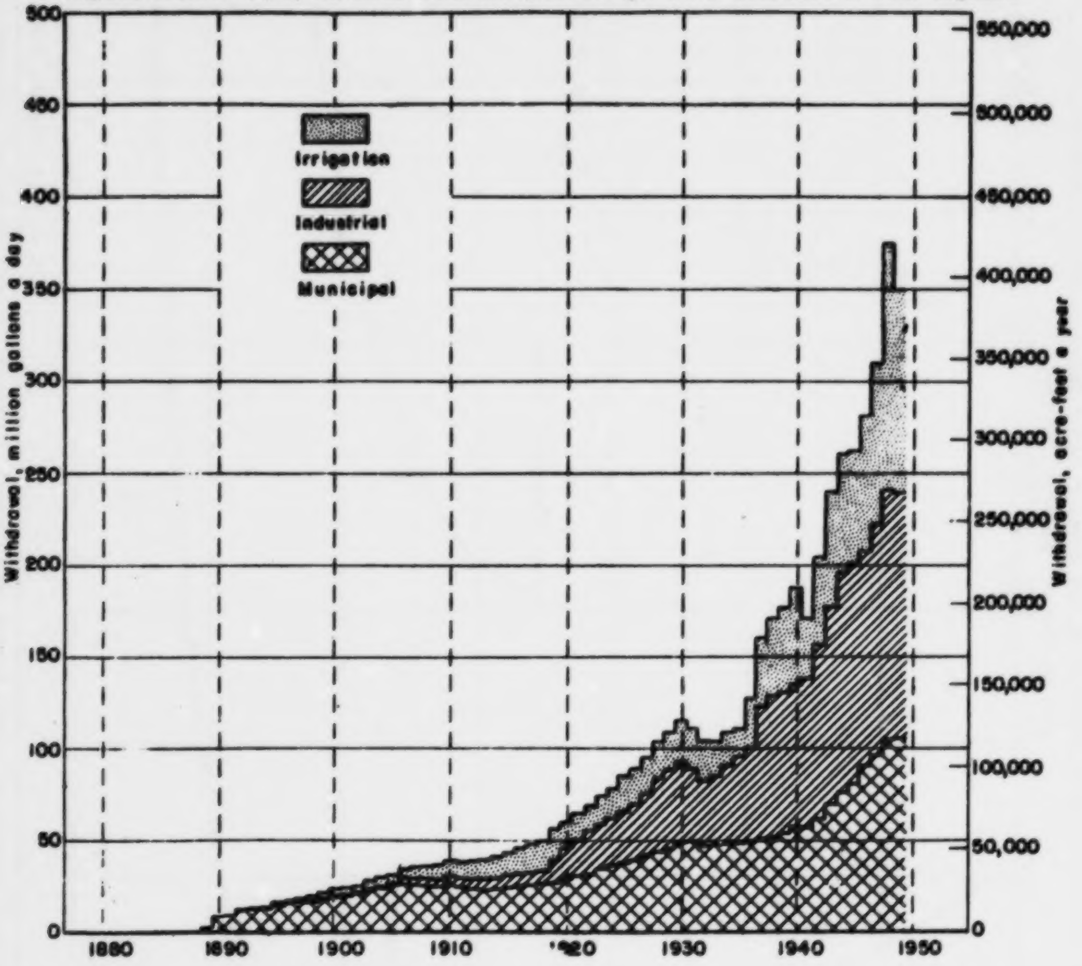

Prepared cooperatively by the United States Geological Survey and the Texas Board of Water Engineers

FIGURE 2 -Ground-water withdrawal in the Houston Gulf Coast region, 1887-1949.

approximately three times the yearly average, or 480 million gallons of surface water and 340 million gallons of ground water per day. Figure 2 is a graphic presentation of the progressive increase in ground water use in the lower portion of the basin for irrigation, municipal and industrial use.

The use of ground water for irrigation has increased rapidly, and in 1948 and 1949 the quantity surpassed that used by municipalities. Irrigation is also the largest surface water user, being responsible for the major part of the diversions from the streams.

During certain stages of growth rice is extremely susceptible to concentrations of chlorides. Consequently strict control of oil field brine waste disposal is required to assure full benefits from irrigation waters.

Recreational Use

The dense population of the basin makes recreational areas necessary and desirable. The basin's many reservoirs, Galveston Bay, and the Gulf of Mexico offer splendid opportunities for water recreation. These waters are now extensively used for swimming, boating, and fishing. They will continue to be used as long as they are kept satisfactorily free from pollution. Some areas of Glaveston Bay have been posted by local officials or by Texas State Health Department in cooperation with local officials as polluted waters, unsafe for swimming. Although these polluted areas are of minor recreational importance and their closing will inconvenience few people, this posting program and other educational activities stimulated corrective action. The rivers are not used extensively for recreational purposes. Some streams are fished occasionally and in a few areas the rivers have fairly good beaches which are used by local residents.

Other Uses

Commercial fishing and oystering in the bay and Gulf were important industries at one time. Gulf fishing still flourishes, but bay fishing is practically extinct. Some few oysters are still being harvested from Glaveston Bay, but several reefs have been closed by the Texas State Department of Health because of pollution.

The economy of the lower basin area is closely integrated with navigation. This important water use both promotes and is affected by pollution. Accidental discharges of oil and other wastes from ships and barges are causes of degradations of a visual nature and sometimes wash upon shores of bathing beaches as well as being toxic to fish and aquatic life. Likewise polluted waters increase the maintenance cost of ships and boats, and the harbor facilities used by them.

Not the least important use of surface waters is that for final waste disposal, since it is recognized that the water courses must be used for the final disposal of domestic and industrial wastes. If this use is not to be abused adequate treatment of wastes must be provided before discharge to the waters. In the Trinity River Sub-basin, the assimilative capacity of some sections of the tributaries and rivers have been overtaxed and nuisances have developed. As a result, portions of some of the streams have been damaged. Fortunately, these conditions are highly localized and total damage to the basin's economy has been small. Corrective action is being initiated in many instances.

POLLUTION CONTRIBUTED TO WATER RESOURCES

Municipal Pollution

Sanitation is well advanced in the basin and most of the communities have sewage collecting systems and treatment facilities. However, pollution from domestic sewage is a problem in some areas. Appendix A lists the sources of municipal sewage according to their location on the watercourse. The table gives other pertinent data (as of January 1952) including the population served, waste treatment provided, adequacy of treatment facilities, population equivalent discharged to the watercourse, treatment needs and the current status of municipal action regarding these needs. The sources of municipal pollution and existing treatment facilities are shown on Map No. 2.

A total of 114 communities, or other population centers with a combined population of about 1,780,000, discharged sewage to the waters of the basin, most of which received treatment before discharge. About 1,670,000 (94%) of the people living in these communities were served by sewer systems in January 1952.

Only two of the total 114 communities (Table A) were discharging untreated sewage to the waters of the basin. These cities, with a combined population served of 86,000 people, are both on tide water. Texas City, the smaller of the two, (population 16,000) has a sewage treatment plant under construction. Galveston, the larger city, (population 70,000) is actively planning construction.

TABLE A

SOURCES OF POLLUTION

MUNICIPAL

January 1952

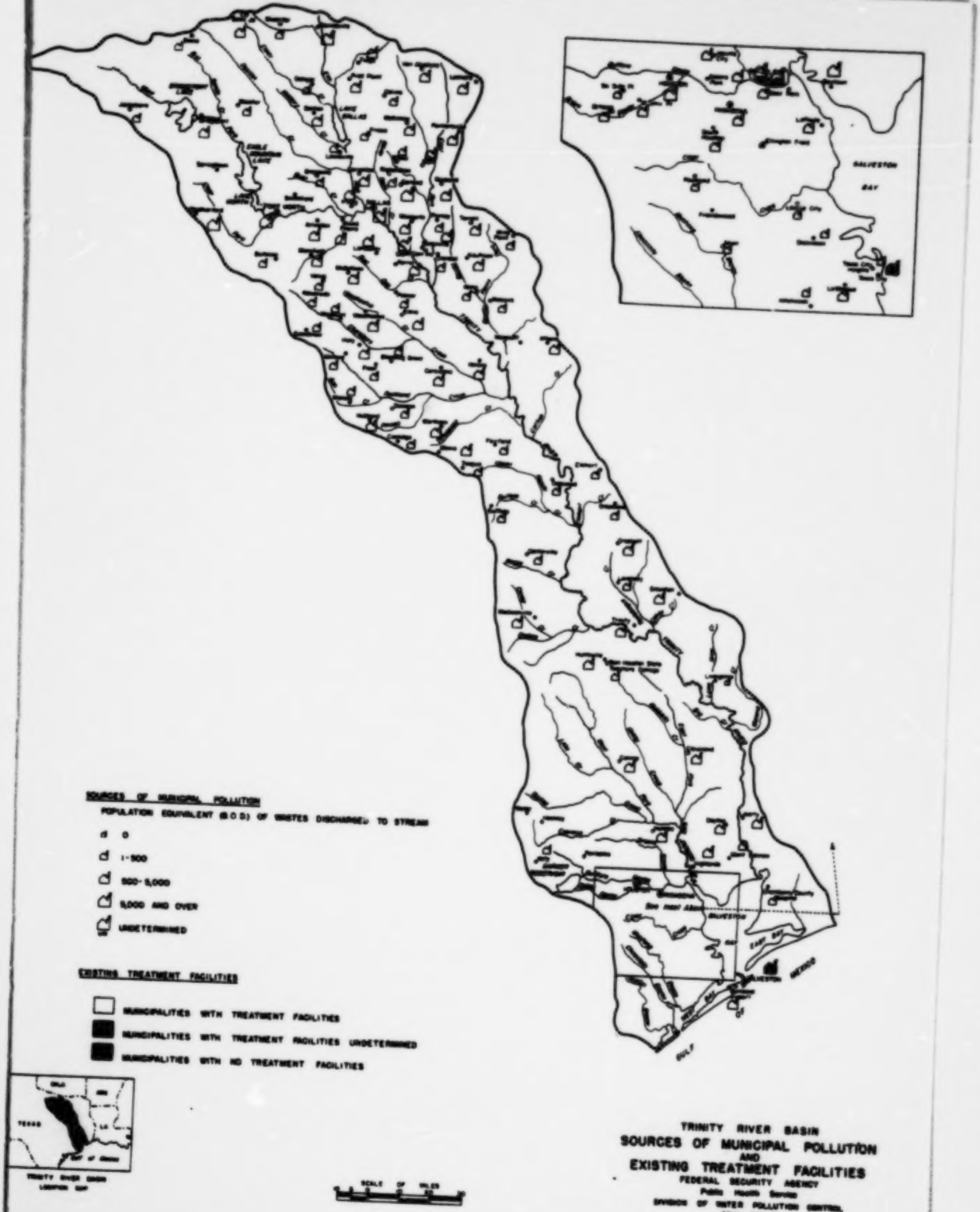
Municipalities*	Sources of Pollution (In Number of Municipalities*)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In terms of Equivalent number of People**)
Having data on pollution load discharged to watercourse	110	1,670,015	364,411
Having population data available (Data on pollution load to watercourse incomplete or not available)	4	Undetermined	Undetermined
Total	114	1,670,015	XXXXXXXXXXX

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

** Includes industrial wastes discharged into municipal sewerage systems. Population Equivalent was computed from the population served and the estimated efficiency of the municipal sewage treatment plant. The plant efficiency was estimated by the District Engineers, State Department of Health, from available data and from knowledge of the operation of the plant.

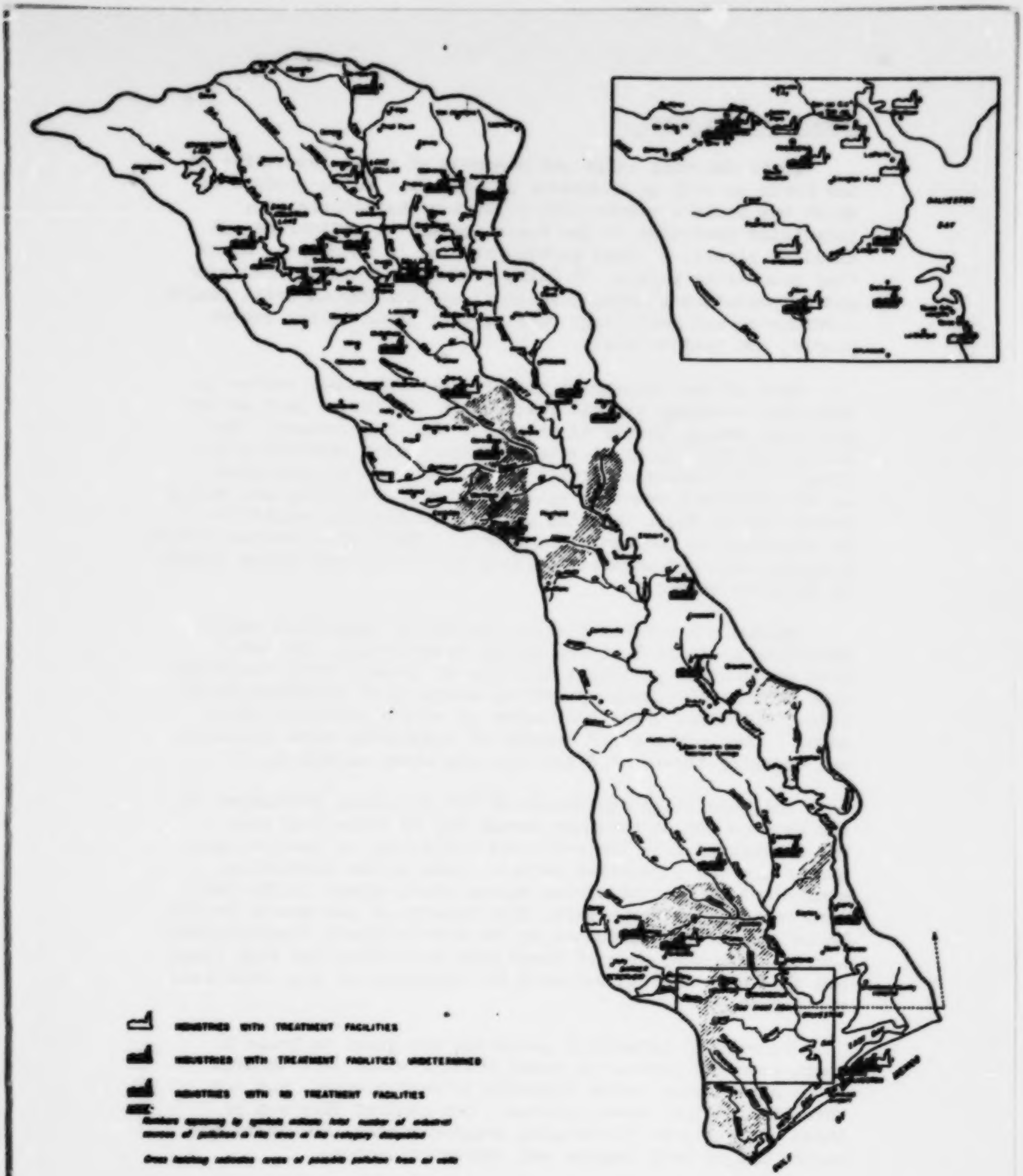
It was estimated that the sewage treatment provided by 110 of the communities reduced the pollution discharged to the watercourse to a population equivalent of about 360,000 people. (See Table A.) This represents a pollution reduction of about 78 percent. There were four communities for which no estimate was made of the treatment provided.

Many residences in the Galveston Bay area have septic tanks with the effluents discharging on to the banks of the bluffs, or directly on to the narrow beaches. In the majority of cases the septic tanks are either not working or are of inadequate capacity and sewage pollutes a zone of approximately 1,500 feet from the shore line. Many homes and business establishments also discharge septic tank effluents into road ditches and this sewage eventually reaches the bay waters.


SOURCES OF MUNICIPAL POLLUTION
POPULATION EQUIVALENT (B.O.D.) OF WASTES DISCHARGED TO STREAM
0
1-500
500-5,000
5,000 AND OVER
UNDETERMINED
EXISTING TREATMENT FACILITIES
MUNICIPALITIES WITH TREATMENT FACILITIES
MUNICIPALITIES WITH TREATMENT FACILITIES UNDETERMINED
MUNICIPALITIES WITH NO TREATMENT FACILITIES
GALVESTON BAY
EAST BAY
GULF
TEXAS
TRINITY RIVER BASIN LOCATION MAP
SCALE OF MILES

TRINITY RIVER BASIN
SOURCES OF MUNICIPAL POLLUTION
AND
EXISTING TREATMENT FACILITIES
FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO 2

26-17


INDUSTRIES WITH TREATMENT FACILITIES
INDUSTRIES WITH TREATMENT FACILITIES UNDETERMINED
INDUSTRIES WITH NO TREATMENT FACILITIES
NOTE:
Numbers appearing by symbols indicate total number of industrial sources of pollution in the area in the category designated
Cross hatching indicates areas of possible pollution from oil wells
GALVESTON BAY
GULF
TEXAS
TRINITY BASIN LOCATION MAP
SCALE OF MILES

TRINITY RIVER BASIN
SOURCES OF INDUSTRIAL POLLUTION
AND
EXISTING TREATMENT FACILITIES
FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 3

26.B

Industrial Pollution

There are many large and hundreds of small industries in the basin as well as thousands of oil wells which produce or which may produce wastes with polluting characteristics. Industries operating in the basin include 41 refineries, 94 chemical plants, 44 meat packing plants, 18 canneries, 8 sea food processing plants, 54 dairy products plants, 4 breweries and fermentation plants, 9 smelters and nonferrous metal plants, 8 rendering and fertilizer plants, also paper mills, rubber plants, and textile mills.

Most of the industrial plants discharge their wastes to municipal sewerage systems where it is treated as part of the municipal sewage before discharge to the watercourses. The Dallas and Fort Worth City Health Departments reported practically all industries within those cities to be connected to the municipal sewerage systems. The Houston City and Harris County health units reported most of the Houston industries to be connected to the municipal sewers. There were several plants, however, that had separate outlets and discharged wastes directly to watercourses.

Appendix B - Table I gives sources of industrial waste according to their location on the watercourse. The table also gives other pertinent data (as of January 1952) including type of waste treatment provided, adequacy of treatment facilities, treatment needs and status of action regarding these needs. The locations of sources of industrial waste pollution and existing treatment facilities are shown on Map No. 3.

The population equivalent of the pollution discharged to the watercourse as sanitary sewage and by industrial plants was calculated from the estimated efficiency of the treatment plants and the population served. Data on the population equivalent of the industrial wastes which appear in the table were secured, in large part, from reports of the Harris County Pollution Surveys conducted by the Harris County Commissioners Court. Although, some of these data were three and four years old they were used to indicate the magnitude of the industrial waste problem.

Sources of industrial pollution are given in Table B. There were 428 industrial sewer outlets which were thought to be discharging wastes directly to watercourses, and not through municipal sewer systems. One hundred thirteen of these outlets were discharging organic wastes, 292 inorganic wastes and 64 both organic and inorganic wastes.

TABLE B

SOURCES OF POLLUTION

INDUSTRIAL*

January 1952

Industries*	Sources of Pollution (In number of Plants)	Amount of Pollution Discharged to Watercourse (In terms of Equivalent Number of People)
Producing Organic Wastes	** 84	532,800
Producing Organic Wastes	*** 93	Undetermined
Producing Inorganic Wastes	**** 292	Not Applicable
Producing Wastes of Undetermined Type	23	Undetermined
TOTAL	***** 428	XXXXXXXXXXXX

* Industries having separate outlets discharging wastes directly to watercourse.

** Includes 13 plants also producing inorganic wastes, 11 plants producing sewage only.

***Includes 51 plants also producing inorganic wastes; and 2 plants producing sewage only.

**** Includes 201 salt water injection wells.

***** Total adjusted to correct for duplication of plants having organic and inorganic wastes.

There are over 235 well defined oil fields in the Trinity River Sub-basin containing several hundred producing oil wells. In addition, there are many areas where the oil wells are too scattered to be grouped into a field. Many of these wells produce salt water waste, some of which may get into the streams. Some of the smaller tributaries may be grossly polluted by this brine but larger rivers appear to have sufficient volume during normal flows to dilute the brine wastes, which enter them, to concentrations which evidently do not affect present water uses.

Data on the amount of salt water wastes produced and pollution prevention measures used to prevent damage to the streams, as reported for five fields that have been studied--namely Humble, Conroe, West Conroe, Tomball, and Hasting, are given below.

The Humble field had about 250 oil wells which produced 10,000 barrels of brine containing 77 tons of salt each day. The Conroe field, with approximately 860 oil wells was producing an estimated 45,000 barrels of salt brine per day. The amount of salt in this waste was not reported. The West Conroe field had only about 11 producing wells. No information was supplied about its waste. The 400 wells in the Tomball field were producing 15,000 barrels of salt water per day with an average chloride content of 40,000 parts per million. The Hastings oil field at Pearland was reported to be affecting the water in Cedar Creek to the extent that it had a chloride content of 1,100 parts per million. The number of wells in this field and the amount of waste produced was not reported.

A large portion of the waste salt water produced in these five fields, and that produced in the other 230 fields, is being injected underground. Most of the balance is disposed of in holding pits. This is discussed in more detail in the section on treatment measures in effect.

Silt Pollution

A form of pollution belatedly recognized but of great magnitude is silt and land wash. These have considerable effect on aquatic life and significant effect on maintenance of navigation channels. The silt is an inert inorganic material but the land wash contains organic and toxic materials such as sprays and insecticides which may adversely affect aquatic life.

The Texas Board of Water Engineers reports an average annual silt load of well over seven million tons in the Trinity River, and approximately one million tons in the San Jacinto River. These two rivers receive about 5,250 acre-feet of silt pollution each year, equivalent to the loss of over one inch of top soil from 160 acres each day.

Other Pollution

Heavy pumping from underground water reservoirs in the Galveston and Texas City area has already caused some salt water encroachment. Increased pumping may intensify salt water infiltration and damage some of the presently satisfactory water-bearing sands. However, decreased pumping in the Texas City area has improved the situation.

DAMAGES TO WATER RESOURCES FROM POLLUTION

The Texas State Department of Health reports that possibly the most serious gross pollution condition existing in the river systems of Texas is in the Trinity River in the vicinity of Fort Worth and Dallas. The phenomenal growth experienced by these cities during recent years has resulted in the sewage treatment plants serving these cities becoming grossly overloaded. This overloaded condition, together with the fact that the flow in the Trinity River is fairly well regulated due to various dams above Fort Worth and Dallas, has frequently resulted in the creation of gross pollution conditions. It is gratifying to report, however, that both Fort Worth and Dallas actually had underway, construction enlarging their treatment facilities. The small municipalities in this area have completed most of their improvement programs and as soon as all of those facilities are completed, the condition of the Trinity River in this area should be materially improved.

The Texas State Department of Health also reported the downstream watercourse status for the Trinity Drainage Basin as good below 49 communities, fair below 24 and unsatisfactory below 17. A nuisance status was reported for the watercourse immediately below 24 communities.

The quality of water of the Trinity River, particularly during periods of low flow, is materially changed by sewage and industrial waste. During these periods, according to Geological Survey records, the quality of water is nearly always impaired by increased dissolved solids at Oakwood, frequently at Romayor, and sometimes completely to the mouth of the River.

Due to the concern felt about the quality of waters of Galveston County, the recreational center of the Trinity River Sub-basin and eastern Texas, the local governmental and civic organizations requested assistance from the Texas State Department of Health to initiate a pollution survey of the county. This resulted in the establishment of a special project known as "The Galveston County Pollution Survey." The report of this Survey (August 1950) lists several areas that were obviously polluted and these were posted with warning signs. The posting of these areas created tremendous interest and activity on the part of local citizens in initiating and carrying out necessary corrective action to eliminate pollution. The final report submitted to the Commissioners' Court included a suggested orderly planned program for corrective action which is now being closely followed.

The yield from the marine fisheries of Galveston Bay, which receives the Trinity and San Jacinto Rivers, at one time surpassed those from any other estuary of the Texas coastline. In 1890, the

Galveston area produced 1,112,000 pounds of trout, redfish, and sheepshead--or approximately 38 percent of the entire bay catch of Texas. In the year between September 1, 1947 and August 31, 1948, the bay fisheries catch in the Galveston area totaled only 336 pounds--or less than 0.2 percent of the total bay catch of Texas. Three factors are reported as responsible for the spectacular decline in the Galveston Bay fisheries, these being, in order of importance, siltation, pollution by oxygen consuming and/or toxic wastes, and overfishing.

The production of oysters from Galveston Bay has declined almost to the point of extinction. This decline, from 33,200 barrels per year to only 60 barrels per year, is believed to be caused by the destruction of oyster reefs through silt pollution, and to the Texas State Health Department's prohibition of the sale of Galveston Bay oysters for food because of sewage contamination.

An outbreak of food poisoning occurred in 1944 at a local oyster dinner in which cases of gastro enteritis were traced to the consumption of raw oysters gathered from polluted areas in Galveston Bay.

The following comment on the condition of Buffalo Bayou appears in the 1950 progress report of the Harris County pollution surveys, conducted by the Harris County Commissioners Court: "Buffalo Bayou is an excellent example of stream degradation. The upper reaches of the bayou are still in good sanitary condition, and as a result the water is clear and abounds with aquatic life. As this same stream of water passes through the ship channel, it has been converted into a reeking, disease-laden, lifeless, open sewer."

A small chemical plant on White Oak Bayou, within city limits of Houston, impounded wastes in a poorly constructed earthen reservoir a few hundred feet above a swimming hole used by neighborhood boys. Leakage through the dyke developed and analyses of this leakage showed 30,000 parts per million of arsenic. Fortunately, no human fatality resulted prior to discovery of this condition which was corrected immediately.

On February 5, 1951 the Dallas Morning News carried a Houston, Texas Associated Press release reporting millions of dead fish in the Trinity River between Anahuac and Moores Bluff. Catfish, buffalo, and shad were reported to line the river from bank to bank. About 35 percent of the fish were catfish, some weighing up to 50 or 60 pounds. The men reporting the fish kill estimated one patch of at least 10 acres of dead fish. Official investigation by the Texas Game and Fish Commission confirmed the fish kill but not to the extent reported by the press. They credited the kill to a quick rise in the river and a possible lack of oxygen in the water; however, the actual cause of the damage was not definitely determined. The National Resources Committee's report of 1937 states, "The lack of water during low water periods on the upper Trinity accentuates the problem of dilution of industrial and municipal wastes and the effect of this pollution from the Fort Worth and Dallas areas is especially noticeable in the stream from Fort Worth all the way to the Gulf. At irregular intervals water is released from reservoirs above, for the purpose of clearing the channel of sewage, but this results in 'black rises.' This creates a serious health menace, kills fish, and causes other nuisances throughout the basin."

It is understood that the high organic content of Galveston Bay waters caused by pollution in many areas make it necessary for industries wishing to use this water to expend considerable sums of money in order to provide chlorination facilities to treat the water for cooling purposes.

Salt water pollution of the San Jacinto River from oil fields in the Humble area resulted in a study by the State Department of Health and initiation of legal proceedings. Possible adverse effects on industrial supplies for the Houston area, as well as on the proposed supplemental Houston domestic supply, were revealed by this study.

Fort Worth and Dallas have expressed concern about oil development in the watersheds supplying their municipal water impoundment reservoirs.

The U. S. Fish and Wildlife service reports damage to aquatic life from the discharge of inadequately treated municipal waste which includes a textile dye from the city of McKinney into the East Fork of the river just below State Highway No. 24.

The Army Engineers report considerable trouble and expense in keeping the ship channels in the Gulf area open. After each major flood, ship traffic is retarded until the sludge and silt has been dredged from the waterways. The volume of San Jacinto River sediment entering the Houston Ship Channel in suspension in an average year is estimated at 1,300,000 cubic yards. With dredging costs at 13 cents per cubic yard, an average annual maintenance cost of almost $170,000 can be attributed to sedimentation from this source alone. No data are available for the cost of removing the sediment carried to the channel by the Trinity River. This is removed with the bottom and spoil bank silt that is shifted into the channel by wave and tidal action and costs cannot be separated for each type of deposit. As the silt load of the Trinity River amounts to over 7,000,000 tons a year, the cost of removing Trinity River silt from the channel is probably as high, if not higher, than the cost of removing the silt deposited by the San Jacinto River.

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BENEFITS RESULTING FROM POLLUTION PREVENTION AND ABATEMENT

The foregoing discussed many ways in which pollution damaged the waters of the Trinity River Sub-basin. It is obvious, of course, that damages avoided as a result of pollution prevention, or abatement, can be considered as benefits of a water improvement program.

Sewage polluted waters are always a threat to the public health. There is a real benefit to the public health and welfare through the treatment of domestic sewage by reducing the chances of water-borne disease infection. Waters polluted by sewage and industrial wastes are often undesirable from an aesthetic viewpoint. By preventing full enjoyment of water recreation, pollution affects the welfare of the basin's people.

The costs attendant to the control of sewage and industrial wastes are great, and are only made worthwhile by virtue of being so much cheaper than the sickness, death, physical discomfort and economic loss that would otherwise prevail.

The beauty of clean waters, the ability to swim, fish, and boat in nearby watercourses, the value of living in an environment free from unsightly and malodorous waters cannot be measured by the dollar sign. Millions of Americans spend millions of dollars to enjoy such pleasures for only a few days of the year.

Aesthetic nuisances reported below many of the communities can be eliminated by pollution abatement and should result in increased value of property along the streams. The State's water pollution control program is aimed at securing these esthetic benefits for the people of Texas.

Streams of the basin have areas where fishing, bathing and recreation were once enjoyed, but pollution of waters has discouraged their continued use. Pollution abatement can bring these areas into more active use and enable many people to enjoy relaxing recreation.

The poor quality of the waters of Galveston Bay has impaired its use for recreational purposes in some areas. Many sections of these waters have been "posted" as unsafe for bathing. Forty percent of Galveston's revenue is secured from aquatic recreational and associated activities. Continuation of the present pollution of the waters may affect this lucrative business, but the pollution prevention and abatement program now underway will do much to protect and develop this valuable resource and should bring increased recreational use.

Pollution, together with overfishing, has virtually wiped out the fishing industry in Galveston Bay, which at one time produced over a million pounds of fish annually. Pollution abatement will do much toward restoration of this industry, and will add to the economy of the area. In addition, proper pollution control will again make it possible for the bay to produce oysters that are safe for human consumption. This will help restore another valuable source of employment and revenue.

Salt brine pollution from oil wells is a threat to some surface water supplies. Once in the water, this brine cannot be economically removed, and potable water cannot be secured. Continued prevention and abatement of brine pollution will insure the availability of water of usable quality.

Most of the surface water used for rice irrigation in the basin originates in, or passes through, oil fields where brine wastes are produced. The proper disposal of the brines to prevent pollution of this irrigation water will be beneficial to the rice growers.

The maintenance of adequate canal, harbor and ship channel depths requires periodic dredging which costs millions of dollars annually. The cost of removing silt deposited in the shipping area by the rivers and streams is difficult to estimate as it cannot be separated from the cost of removing that brought into ship channels from existing deposits through the action of currents, waves, and tides. The heavy silt burden of the rivers leads to the conclusion that much of the ship channel siltation is caused by annual deposition from streams. Soil conservation practices in the farm areas of the basin can do much towards reducing the silt load of the rivers. The monetary savings cannot be determined, but would probably be hundreds of thousands of dollars annually. Other benefits to be derived from soil conservation practices are reduced interference with water-borne shipping because of reduced dredging time and, most valuable of all, the retention of unreplaceable top soil and fertility on the fields where it can serve the farmers and the nation.

Ground water supplies are being rapidly depleted in some areas and are being threatened with salt intrusion in others. Many communities are faced with the problem of supplementing ground water supplies with surface water. Therefore, the maintenance of clean water for municipal use near the community is of material benefit.

In some instances industry, concurrent with pollution abatement, may be benefited through greater utilization of raw materials and recovery of by-products. Adequate waste treatment may enable industry to re-use water now going to waste. In an area where water supply is limited, this is of great economic importance.

In addition to the obvious benefits that can be realized by correcting the polluted conditions now causing known damages, there is the benefit projected into the future of having clean water so necessary to the development of the State.

POLLUTION PREVENTION MEASURES IN EFFECT

Laws and Regulations

The Texas Water Pollution Control Agency considers its present laws generally adequate to correct any cause of pollution. A brief discussion of these laws follows:

In 1913, Texas passed legislation prohibiting the pollution of any "watercourse or other public body of water." The State Board of Health was designated to enforce the provisions of the Act and the State Game and Fish Commission was given permissive jurisdiction for the protection of fish and oysters. In 1945, a General Sanitation Law was adopted which established minimum standards of sanitation and health protection measures, and gave to the State Department of Health the specific responsibility for establishing necessary rules and regulations and the enforcement thereof.

Jurisdiction is state-wide and covers pollution of any watercourse or other public body of water from which water is taken for the uses of farm livestock, drinking and domestic purposes. The responsibility is shared with the Game and Fish Commission, insofar as protection of fish and oysters is concerned.

Responsibility is further shared with all home rule cities which have the right to prevent pollution of their public water supply, and with all of the many water improvement and conservation districts both for surface and sub-surface waters. These water districts have the right to establish rules and regulations protecting water resources within the area of the district from pollution.

The State Land Commission is responsible for determining that oil well developments on state owned lands do not pollute surface and sub-surface waters. The enforcement of the Land Commission's rules and regulations is handled by the Game and Fish Commission, unless it involves pollution of water used for drinking, domestic purposes or livestock, when the State Health Officer assists in enforcement.

The existing anti-pollution statutes of Texas have proved quite satisfactory according to the officials of the State agencies having water pollution control functions. These laws have been interpreted by the courts to imply that no waste discharged into a watercourse of the State shall be of such a nature as to materially affect the quality of the receiving waters. Thus, in effect, the Texas Legislature has established the policy that the best water use shall be the highest water use. The enforcement agencies have followed a policy of attempting to maintain waters of the highest possible quality throughout the State.

Existing Municipal Treatment Facilities

Through the efforts of the Texas State Department of Health, sanitation is well advanced in the basin and 1,670,000 people (seventy percent of the basin total population of 2,400,000) are now served by public sewer systems. Further evidence of the effectiveness of the pollution control program is the fact that 94 percent of the sewered population is served by treatment plants.

On January 1952, all but two of the sewered communities had sewage treatment plants (Table C). Seventy-four of these had 112 plants which provide secondary as well as primary treatment for a population of over one and one half million people. The remaining 38 communities, serving about 64,000 people, had 42 sewage treatment plants which provide primary treatment only.

TABLE C

EXISTING TREATMENT FACILITIES

MUNICIPAL

January 1952

Degree of Treatment Provided	Municipalities*	Number of Treatment Plants	Population Served
Primary	38	42	63,850
Secondary	74**	112	1,520,165
No Treatment	2	-	86,000

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers.

** Includes three communities which also have primary treatment plants.

Existing Industrial Waste Treatment Facilities

Most of the industries in the basin discharge their wastes into municipal severage systems where it is treated with the domestic sewage obviating the need for treatment of the waste by the industry. Many other industries provide treatment that is unreported.

The control of industrial waste pollution is very effective in Dallas and Fort Worth where the State, City and County Health Units have been instrumental in getting all industrial wastes produced in those cities discharged to the municipal sewerage systems so that it can be treated in the municipal sewage treatment plants.

Table D is a compilation of the industries for which information on industrial waste being discharged directly to the watercourse was available January 1952.

The table gives the number of plants that had treatment, no treatment or undetermined facilities. It shows that the 176 industrial establishments, and the oil fields for which information was available, had an estimated 428 industrial waste outlets. Three hundred thirty-two of these were served by waste treatment facilities including 201 salt water injection wells. Untreated wastes and sewage were known to be discharged from 24 outlets. Treatment facilities for the other 72 outlets were undetermined.

TABLE D
EXISTING TREATMENT FACILITIES

INDUSTRIAL*

Type of Industry	Number of Plants	Number of Industrial Plants Having		
		Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and Allied	37	11	2	24
Sanitary Sewage	1	1	0	0
Textile Mill	2	1	0	1
Lumber & Wood Products	6	1	0	5
Paper and Allied	7	5	1	1
Sanitary Sewage	1	1	0	0
Chemical and Allied	43	23	8	12
Sanitary Sewage	21	20	1	0
Petroleum & Coal	32	15	1	16
Sanitary Sewage	13	13	0	0
Rubber Products	4	3	1	0
Sanitary Sewage	3	3	0	0
Leather	1	0	0	1
Primary Metals	3	2	0	1
Sanitary Sewage	4	4	0	0
Fabricated Metals	16	5	6	5
Sanitary Sewage	10	10	0	0
Oil Production**	201	201	0	0
Other Mining	1	0	1	0
Miscellaneous	11	4	3	4
Sanitary Sewage	11	9	0	2
TOTAL	428	332	24	72

* Industries having separate outlets discharging wastes directly to watercourse.

** There were 201 salt water injection wells known to be operating in the basin. These were all constructed during the years 1947 to date. No data could be tabulated for wells constructed prior to 1947. The actual number of individual sources of salt water waste from the basin's thousands of oil wells has not been established.

NOTE: Fifty-one industries discharged both sanitary sewage and industrial wastes. Thirteen discharged only sanitary sewage. The sanitary sewage outlet has been listed as a separate source of pollution whenever the industry had a separate sewer system and outlet for sanitary waste. This was necessary to present a true picture of the treatment provided for the industrial wastes of the basin as many industries have treatment for their sanitary sewage and no treatment, or only minor treatment for their industrial wastes.

Thirteen industries were discharging only sanitary sewage and no industrial wastes. Forty-eight of the industries were discharging sanitary sewage as well as industrial wastes. Most of these industries provided separate treatment for their sanitary sewage and generally provided a higher degree of treatment for the sewage than they did for the industrial waste. Table D has been prepared with the information on sanitary sewage listed as sub-items for those industries having information on industrial wastes and sanitary sewage.

The Texas Game and Fish Commission has always been deeply concerned with the effects of pollution on the receiving waters in the Houston and Galveston area. By direct request from this state agency several industries have instituted greatly improved recovery processes and constructed new and enlarged waste treatment facilities.

One outstanding result of the continued drive to eliminate pollution is the almost complete absence of oil slick or oil deposits in the Houston ship channel and adjacent waters. This is remarkable for a port which handled 32 million tons of petroleum products in 1950 and the water pollution control agencies are to be commended on the job they have done in this area. Their efforts need to be continued and expended, especially in regard to pollutants of an organic nature.

As a result of joint pollution control efforts of the State Department of Health and the cooperation of the Railroad Commission and the Game and Fish Commission, reinjection of salt water from oil wells into sub-surface strata is practiced in many of the oil producing areas of the basin. Holding ponds or lagoons are also used for brine disposal in many areas, but are generally unsatisfactory.

The Humble field, with about 250 wells, was producing 10,000 barrels of brine containing 77 tons of salt each day. Forty percent of this waste was being injected underground through three injection wells. The balance was being discharged to holding pits or going directly to the river. Plans were being made to inject all of the waste from this field into underground strata so none will reach the streams. Table 2 of Appendix B gives the County in which the Humble and other fields are located.

The Conroe oil field was reported to have 860 oil wells. It had 28 salt water injection wells which disposed of 90 percent of the salt water wastes. The other 10 percent of the waste was discharged to holding pits. Salt water production in this field amounts to 45,000 barrels per day. The amount of salt in this waste was not reported.

The West Conroe field had only about 11 producing oil wells. Holding pits were used for disposal and no action is being taken to improve the method of disposal.

The Tomball field with 400 wells was producing 15,000 barrels of salt water wastes per day with a chloride content of 40,000 parts per million. All of this waste was being disposed of underground by 10 injection wells.

The Hasting oil field at Pearland had an unreported number of injection wells which were taking about 90 percent of the salt water wastes. The balance was discharged to holding pits. The amount being injected was undetermined as was the amount going to the basin waters.

Salt water injection wells are doing an important job in protecting the waters of the basin. They offer the most practical and positive way now known for disposing of oil field salt water waste. The quantity of waste being handled satisfactorily by individual injection wells in the basin varies from less than 150 gallons per day to approximately 500,000 gallons per day.

Detailed information was readily available for only the five oil fields discussed above. The total number of salt water injection wells now operating in the Trinity River Sub-Basin is not known, but information was secured from the Texas Railroad Commission for 201 injection wells which have been constructed during the years 1947 through 1951. The files of the Railroad Commission also contained data on the wells constructed prior to 1947 but that information was not in a form which permitted extracting the desired data in the time available. Appendix B - Table 2 lists the known 201 injection wells, giving the county where they are located, the owner of the well, oil-field, type of well (gravity or pressure), quantity of salt water waste handled and the date the well was constructed.

One hundred and twenty-four of the injection wells for which data was secured are located in 54 of the 236 named oil fields. The other 77 injection wells are located in "County Regular" fields (areas where the oil deposits are too small and scattered to warrant designation as specifically named oil fields). The 124 injection wells operating in the "named" fields are used for the disposal of a total of about 11,500,000 gallons of salt water waste per day. The 77 injection wells in the "County Regular" fields are handling about 310,000 gallons of waste per day. These later wells take care of an average of approximately 4,000 gallons of salt water per day per well. The wells in the "named" oil fields handle an average of 60,000 gallons per day per well. This difference might be due to lower salt water production in the shallow "County Regular" fields or to the wide dispersion of the "County Regular" wells which makes it uneconomical for one injection well to serve several producing oil wells as is common practice in the "named" fields.

Adequacy of Design and Operation of Existing Facilities

The adequacy of design and operation of the sewage treatment plants found in the basin is summarized in Table E.

TABLE E

ADEQUACY OF EXISTING TREATMENT FACILITIES

MUNICIPAL*

January 1952

Number of Municipal* Treatment Facilities	Adequacy With Relation To					
	Capacity			Operation		
	Satis.	Unsat.	Undet.	Satis.	Unsat.	Undet.
154	79	74	1	108	39	7

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreation centers or other population centers.

It will be noted that 79 (51%) of the municipal plants had satisfactory capacity while 74 were considered to be inadequate. Operation was satisfactory at more than two-thirds of the municipal plants. Unsatisfactory operation of many of the other plants can be attributed to overloaded or inadequate facilities.

TABLE F

ADEQUACY OF EXISTING TREATMENT FACILITIES

INDUSTRIAL*

January 1952

Number of Industrial* Treatment Facilities	Adequacy With Relation To					
	Capacity			Operation		
	Satis.	Unsat.	Undet.	Satis.	Unsat.	Undet.
404	252	64	88	277	20	107

* Industries having separate outlets discharging wastes directly to watercourse.

Table F is a summary of the adequacy of industrial waste treatment or disposal facilities. Information on capacity was known for 252 (62%) of the industrial waste and sewage treatment plants, 59 of which were plants treating sanitary sewage and 201 were salt water injection wells.

Information on the operation of the industrial waste treatment plants was limited. The majority of installations for which information was available were plants treating sanitary sewage or were salt water injection wells.

Recent Activity in Pollution Abatement

Much progress has been made in recent years in stream pollution abatement in the Trinity River Sub-Basin as shown in Table G.

Through the efforts of the State Department of Health, 71 of the basin's municipal sewage treatment plants, serving over a million people, have been constructed or have had major additions or enlargements installed in the past 6 years. The majority of these were for the replacement of obsolete plants, or to increase capacity or furnish additional treatment facilities for communities where existing plants were unsatisfactory.

TABLE G

PROGRESS IN CONSTRUCTION OF POLLUTION ABATEMENT FACILITIES

Year	Sewage Treatment Plants Completed	Design Population	Waste Treatment Plants Completed*	Amount of Waste Treated (In Terms of Equiv. Number of People)
1946	3	22,100	No data	- - -
1947	5	18,525	44	- - -
1948	6	245,050	36	- - -
1949	11	61,400	47	- - -
1950	27	580,520	37	- - -
1951	19	97,430	37	- - -

* All industrial plants listed are salt water injection wells. Date of construction for other industrial treatment facilities were not available.

Information was not available concerning industrial waste treatment facilities constructed in recent years with the exception of salt water disposal wells. Many of the industries have installed treatment facilities and many others improved those they had. Seven industries in the Galveston area have expended over $7,675,000 for waste disposal facilities to treat an estimated 17 million gallons of waste per day. Much of this work has been done since 1945. The Corps of Engineers recently approved the proposal of two industries to dump their wastes in the Gulf of Mexico about 10 miles from shore. One of the dumping areas is off-shore from Galveston, the other is out from Sabine Pass.

Soil conservation projects are operating in parts of the basin but factual data are not readily available on the amount of silt pollution being kept out of the streams. Due to the large amount of silt coming from natural sources the effect of soil conservation practices is not apparent by visual inspection of the streams. However, the Soil Conservation Service has some data indicating reductions of 30 to 40 percent or more in limited areas of the Western Gulf Drainage Basin and it can be assumed that this also holds true for those parts of the Trinity River Sub-Basin where soil conservation is being practiced.

POLLUTION PREVENTION MEASURES REQUIRED

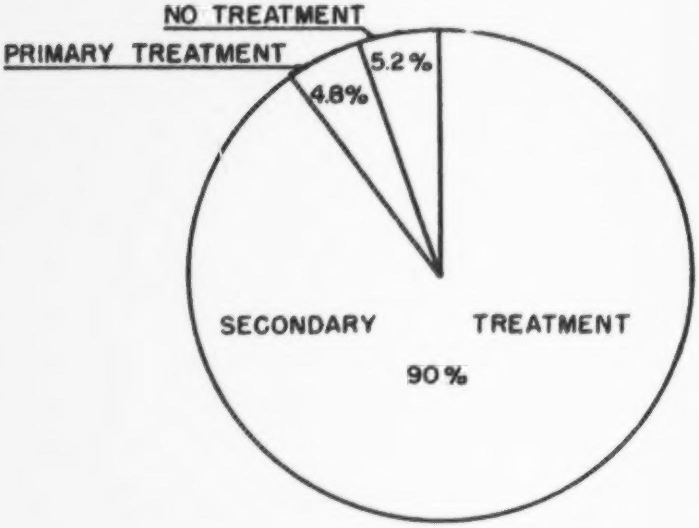
The obvious needs in the pollution control program of the Trinity River Sub-Basin are: replacement of or additions to sewage plants in communities which have inadequate sewage disposal facilities; the reduction of industrial wastes to a practical minimum and the treatment or satisfactory disposal of the remaining waste; the adequate disposal of oil field brines; and the protection of watershed areas from actions that destroy the water resources.

The regulatory agencies lack personnel and funds to effectively administer the comprehensive program of pollution abatement. Present State technical personnel for survey and investigational work and monies for control purposes are so limited that any abatement program must be a long term one with resultant delay in accrued benefits.

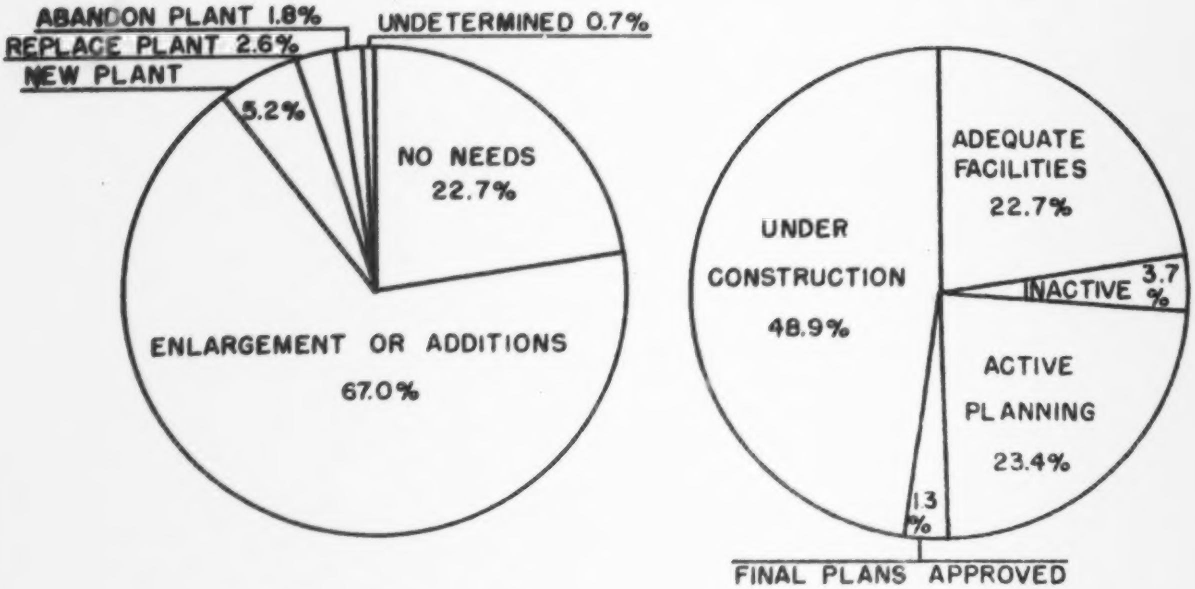
Although the Trinity River Sub-Basin is well advanced in domestic sewage collection and treatment, (see figure 3) a great deal of plant construction and reconditioning is needed before satisfactory pollution abatement is realized. There are several plants providing primary treatment only which need the addition of secondary treatment units before they will conform to the State's requirement of secondary treatment for all sewage.

The Texas State Department of Health estimated (January 1952) that it would be necessary to construct 3 new plants, enlarge or make additions to 50 plants, and completely replace 23 others if the domestic sewage originating in the basin is to receive adequate treatment. As shown in Table H below, 74 plants were considered adequate and there was one plant for which the needs had not been determined. Recommendations were made that 6 plants be abandoned. In these six instances the municipalities had, or will have, adequate treatment facilities at other plants for the sewage being treated at the plants recommended for abandonment. Five towns had satisfactory capacity but needed some additions or enlargement to improve condition of effluent. One plant in Houston was of adequate capacity but needed to be abandoned by connection to another system. One plant in Corsicana had unsatisfactory capacity but was not considered as needing any additional facilities as another plant was under construction.

TRINITY RIVER BASIN
MUNICIPAL SEWAGE TREATMENT PROGRAM
BASED ON SEWERED POPULATIONS



EXISTING TREATMENT FACILITIES



TREATMENT NEEDS STATUS OF PROGRAM

FIGURE NO. 3

TABLE H

WASTE TREATMENT NEEDS - MUNICIPAL*

January 1952

Needs	Number	Population Served by Facilities
New Plant	3	86,000
Enlargement or additions to existing plant	50	1,126,335
Replace existing plant	23	43,445
No project required	74	372,335
Abandon plant	6	30,700
Undetermined	1	11,200

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers.

NOTE-- Plants for which abandonment is specified are located in municipalities that have one or more other plants where the sewage of the abandoned plant can be treated.

The present cost of providing these needed municipal improvements is estimated to be $10,060,000. This estimate, based on presently known needs, is for treatment plant capital expenditures only and does not include costs of land, right-of-way, sewers, etc., nor does it take into account maintenance and operating costs.

The industrial waste pollution measures required to safeguard the waters of the basin for present and future needs were determined for 313 sources of pollution. Table I is a summary of these industrial waste pollution needs.

TABLE I

INDUSTRIAL* WASTE POLLUTION ABATEMENT NEEDS

January 1952

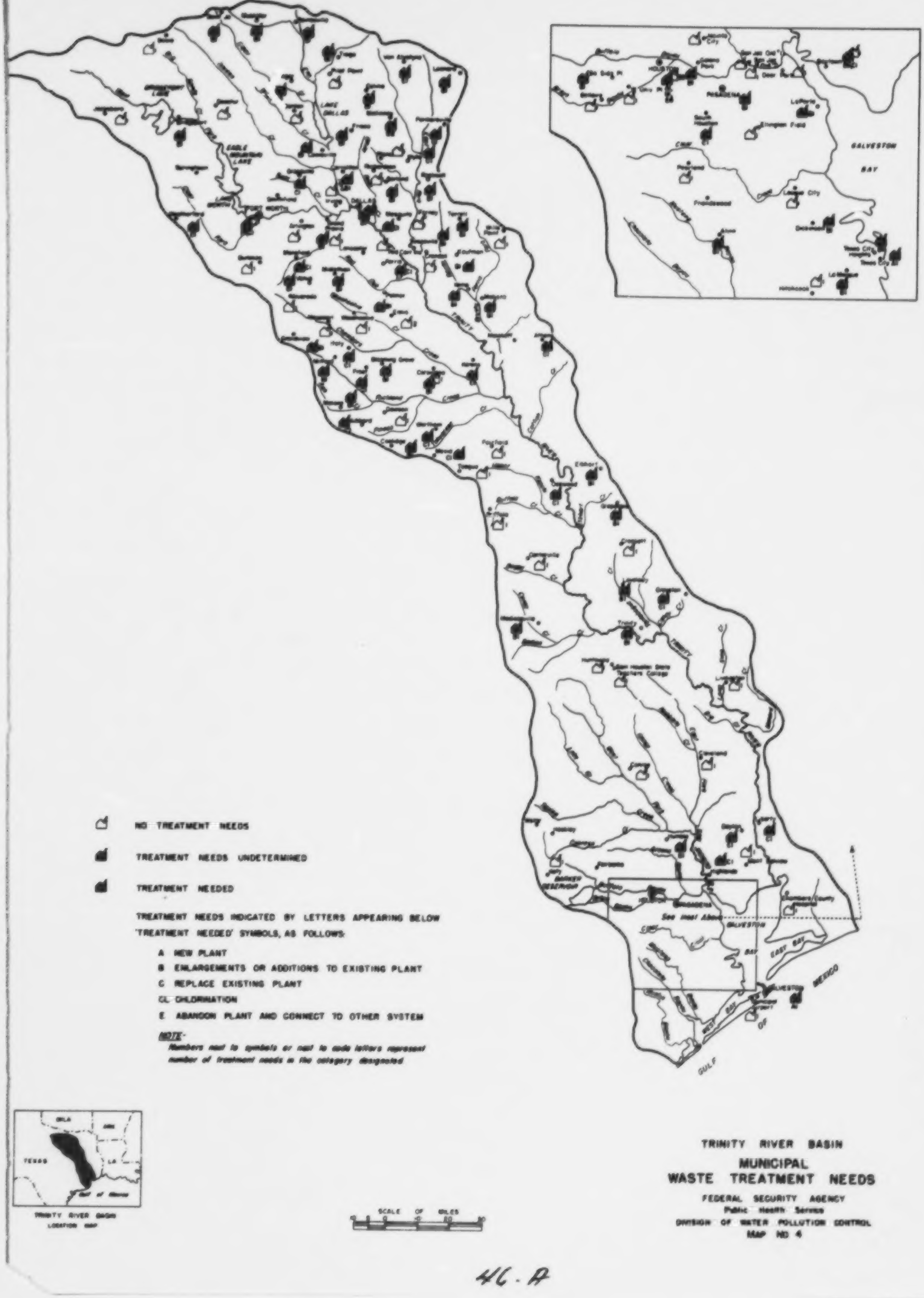
Needs	Number
New Treatment Plant or other Pollution Control Measures	4
Enlargement of Additions to Existing Plants	48
Replace Existing Plant	6
Connection to Municipal Sewer System	3
No Project Required	252
Undetermined	115

* Industries having separate outlets discharging wastes directly to watercourse.

The known requirements (January 1952) include 4 new plants for treatment of industrial waste; additions or enlargements of 48 plants, 24 of which were treating sanitary sewage only; and the replacement of 6 plants, 4 of which were treating only sanitary sewage.

Three industries can solve their pollution problem by connecting to the municipal sewer system. Two hundred and fifty-two sources of industrial waste were being treated in a satisfactory manner and required no additional treatment. Twenty-four of these sources were discharging sanitary sewage for which secondary treatment units had been provided.

In addition to the 313 industrial waste sources for which abatement needs were known there were 115 other sources of industrial pollution for which insufficient data were available to determine the needs.


GALVESTON BAY
EAST BAY
WEST BAY
GALVESTON
GULF OF MEXICO
See Inset Above
LAKE DALLAS
EAGLE MOUNTAIN LAKE
TRINITY
OKLA
ARK
TEXAS
LA
Gulf of Mexico
TRINITY RIVER BASIN LOCATION MAP
SCALE OF MILES
10 0 10 20 30

☐ NO TREATMENT NEEDS

■ TREATMENT NEEDS UNDETERMINED

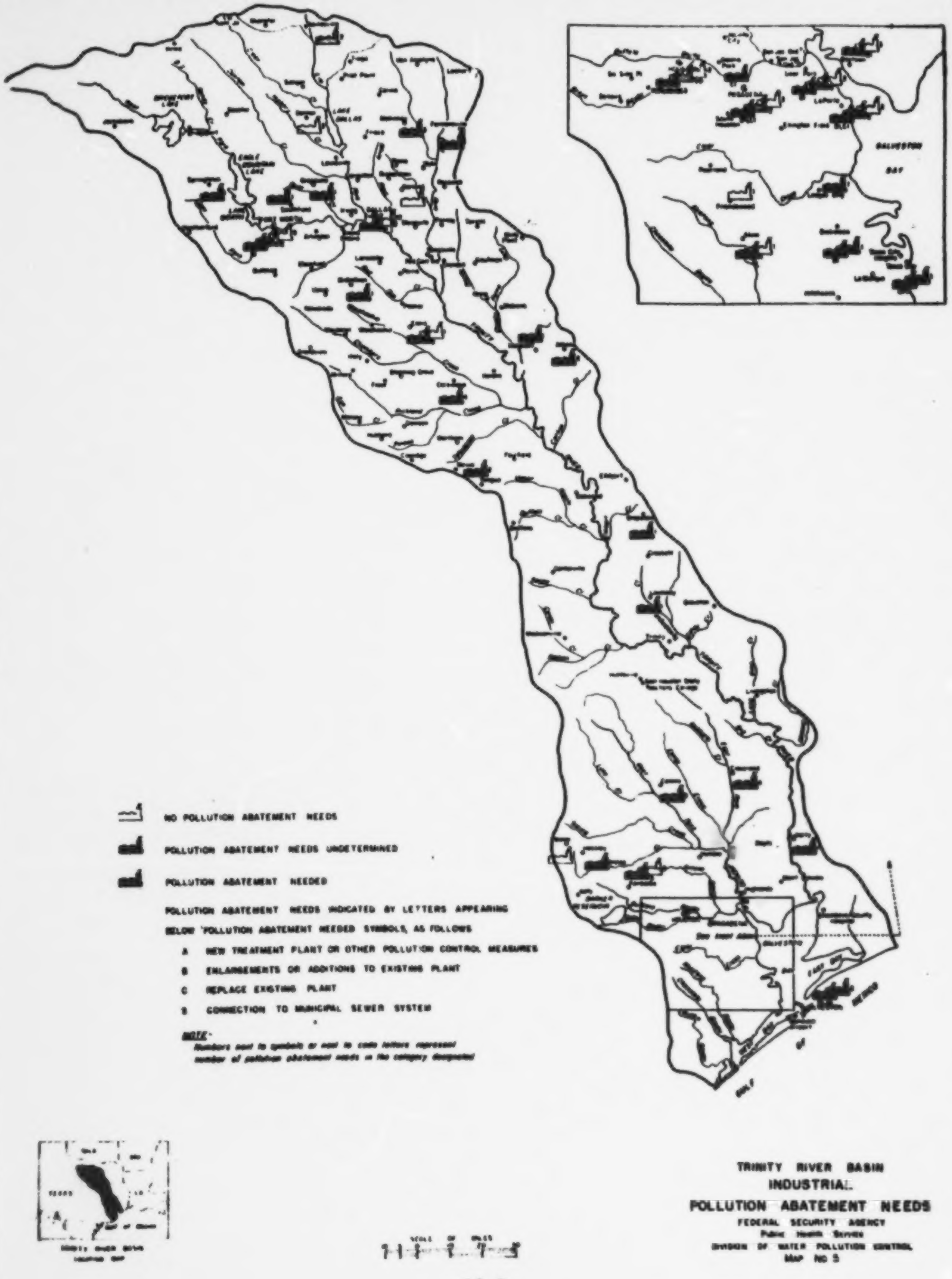
■ TREATMENT NEEDED

TREATMENT NEEDS INDICATED BY LETTERS APPEARING BELOW 'TREATMENT NEEDED' SYMBOLS, AS FOLLOWS:

A NEW PLANT
B ENLARGEMENTS OR ADDITIONS TO EXISTING PLANT
C REPLACE EXISTING PLANT
CL CHLORINATION
E ABANDON PLANT AND CONNECT TO OTHER SYSTEM

NOTE-
Numbers next to symbols or next to code letters represent number of treatment needs in the category designated

TRINITY RIVER BASIN
MUNICIPAL
WASTE TREATMENT NEEDS
FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO 4


GALVESTON BAY
GULF
NO POLLUTION ABATEMENT NEEDS
POLLUTION ABATEMENT NEEDS UNDETERMINED
POLLUTION ABATEMENT NEEDED
POLLUTION ABATEMENT NEEDS INDICATED BY LETTERS APPEARING BELOW 'POLLUTION ABATEMENT NEEDED SYMBOLS, AS FOLLOWS
A NEW TREATMENT PLANT OR OTHER POLLUTION CONTROL MEASURES
B ENLARGEMENTS OR ADDITIONS TO EXISTING PLANT
C REPLACE EXISTING PLANT
S CONNECTION TO MUNICIPAL SEWER SYSTEM
NOTE-
Numbers next to symbols or next to code letters represent number of pollution abatement needs in the category designated
SCALE OF MILES
TRINITY RIVER BASIN LOCATION MAP

TRINITY RIVER BASIN

INDUSTRIAL

POLLUTION ABATEMENT NEEDS

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO 5

46.B

Table J summarizes the January 1952 status of municipal action on known pollution abatement needs and Table K summarizes the January 1952 status of industrial action on these needs.

TABLE J

CURRENT STATUS OF MUNICIPAL* ACTION ON

POLLUTION ABATEMENT NEEDS

January 1952

Status of Action	Number of Municipalities*
Inactive	41
Active Planning	28
Final Plans Approved	2
Under Construction	11
Undetermined	0

* Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers.

TABLE K

CURRENT STATUS OF INDUSTRIAL* ACTION ON

POLLUTION ABATEMENT NEEDS

January 1952

Status of Action	Number of Industries*
Inactive	36
Active Planning	18
Final Plans Approved	0
Under Construction	1
Undetermined	6

* Industries having separate outlets discharging wastes directly to watercourse.

According to the Texas State Department of Health 41 municipalities and 36 industries were making no known effort to correct the pollution caused by their wastes. Active pollution abatement activities were being carried out by 28 municipalities and by 18 industries but final plans had not been approved. Final plans had been approved for 2 municipalities while 11 municipalities and one industry had wastes treatment facilities under construction. The status of pollution abatement activities for 6 industries were still to be determined.

Table L is an itemized list of municipalities and industries known to need improvements for abatement of pollution or for which data were too limited to determine such needs on January 1952. This table lists all municipalities and industries known to discharge wastes to basin waters except those that were considered to have adequate treatment facilities. Limited information for oil fields precluded the inclusion of sources and disposal needs for oil field waste in Table L.

Large volumes of oil field brines are now disposed of by injection into subsurface strata or by storage in holding basins. Occasionally the capacity of the storage basins are insufficient and wastes are discharged to watercourses. Some storage basins are permitted to overflow while others develop leaks or breaks which permit polluting wastes to reach the waters of the basin. To adequately protect the waters of the basin for all present and future uses many of these storage basins must be abandoned and subsurface disposal facilities provided. The total number of subsurface disposal plants needed and the number of storage basins that require improvements is not known and much time and study would have to be expended before definite requirements could be ascertained.

Soil conservation programs are well established as evidenced by the contour farming visible in all parts of the basin. The continued heavy silt burden of the streams, however, indicates that much more work is needed before the silt pollution of the basin is brought under control.

Many municipalities, industries, and oil fields are still without adequate waste treatment and disposal facilities. The limited industrial and oil field waste data indicates the need of the pollution control agency for additional funds and personnel so this important phase of the pollution abatement and control program can receive the attention it merits prior to the creation of critical conditions.

Industry and municipalities should operate such treatment facilities as are available in the most efficient manner to get full value from monies expended.

Industry should be encouraged to study their processes and wastes to the end that a minimum of wastes, both qualitatively and quantitatively, have to be discharged to the watercourses of the basin.

TABLE L

MUNICIPALITIES AND INDUSTRIES NEEDING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

January 1952

Name and Location	Population Served*	Improvements Needed	Remarks
Alvin	3,050	additions	act. planning
Phillips Petroleum Co.	undet'd	undet'd	
Athens	3,750	replacement	act. planning
Athens Canning Co.	undet'd	undet'd	
Vander Meers Locker Service	undet'd	undet'd	
Baytown (Baytown Plant)	24,000	additions	act. planning
(Pelly Plant)		replace	
(Goose Creek Plant)		enlargement	
(Morrell Park Plant)		enlargement	
General Tire & Rubber Co.	undet'd	additions	act. planning
Blooming Grove	470	additions	inactive
Bridgeport	2,000	additions	act. planning
Carrollton	1,270	add.&enlarg.	inactive
Celina	785	additions	inactive
Cleveland			
Cleveland Veneer Co.	undet'd	undet'd	
Grimes Veneering Mill	undet'd	undet'd	
Mathews-Johnson Veneer & Panel Co.	undet'd	undet'd	
Cleveland Creosoting Co.	undet'd	undet'd	
Conroe			
Columbia Carbon Co.	undet'd	undet'd	
Conroe Creosoting Co.	undet'd	undet'd	
Humble Oil Refining Co.	undet'd	undet'd	
Midland Gasoline Co.	undet'd	undet'd	
Superior Oil Co.	undet'd	undet'd	
Coolidge	600	additions	inactive
Corsicana (Plant No. 2)	14,900	additions	final plans appro.
Cream Crest Dairies	undet'd	undet'd	
Dixie Velvet Ice Cream Co.	undet'd	undet'd	
Keens of Texas, Inc.	undet'd	undet'd	
Mid-Co. Gasoline Co.	undet'd	undet'd	
Dallas (Main Plant)	483,700	additions	under const.
(Pleasant Grove Plant)	11,200	undet'd	
Chance Vought Aircraft Corp.	undet'd	undet'd	
Texas Engr. & Mfg. Co.	undet'd	undet'd	
Dayton	1,020	replacement	under const.

* NOTE - Values used for industrial wastes is the population equivalent of the waste discharged to the watercourse.

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Deer Park			
Diamond Alkalie Corp. (san. sew.)	300	addition	inactive
Rohm and Haas (ind. waste)	undet'd	undet'd	
(san. sew.)	122	undet'd	
Shell Oil Co. (ind. waste)	35,000	undet'd	
(san. sew.)	1,900	undet'd	
Dickinson	800	additions	act. planning
Adams-Heaner Co.	undet'd	undet'd	
Mineral Oil Refining Co.	undet'd	connect to city sewer	under const.
Elkhart	420	additions	inactive
Ennis			
Planters Cotton Oil Mill	undet'd	undet'd	
Sani-Wax Co.	undet'd	undet'd	
Fairbanks			
Columbia Carbon Co.	- - - -	undet'd	
Distillate Production Co.	undet'd	undet'd	
Warren Petroleum Corp.	undet'd	undet'd	
Farmersville	1,660	replacement	inactive
McGraw Candies Inc.	undet'd	undet'd	
Ferris	1,500	replacement	inactive
Fort Worth	275,000	enlargement	under const.
General Portland Cement Co.	- - - -	undet'd	
Premier Oil Refining Co.	undet'd	undet'd	
American Mfg. Co.	undet'd	connect to city sewer	act. planning
Frisco	460	additions	inactive
Frost	450	replacement	inactive
Gainsville	10,000	enlargement	under const.
Chaffin Packing Co.	undet'd	undet'd	
Tydol Refinery	undet'd	undet'd	
Galena Park	8,000	add.&enlarg.	under const
Drumex Corp.	undet'd	replacement	undet'd
Galveston	70,000	new plant	act. planning
Dickson Weather Proof Co.	- - - -	connect to city sewer	act. planning
Farmers Marine Cooper Wks.	- - - -	undet'd	
High Grade Packing Co.	undet'd	additions	inactive
Gulf Rendering Co.	undet'd	undet'd	
Garland	10,000	additions	act. planning
Grand Prairie	15,700	additions	under const.
Grandview	500	additions	inactive
Grapeland	900	enlargement	inactive
Lone Star Producing Co.	undet'd	undet'd	
Grapevine	1,200	replacement	act. planning
Wrights Veneer Factory	undet'd	undet'd	
Groveton	1,000	replacement	inactive

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Handley	3,000	replacement	inactive
Highlands	2,000	replacement	under const.
Hockley			
United Salt Corp.	- - - -	undet'd	
Houston (Magnolia Plant)	10,000	abandon plt.	act. planning
(Simms Bayou Plant)	200,000	enlargement	act. planning
(Clinton Park)	3,700	abandon plt.	act. planning
(Garden Villas)	5,000	abandon plt.	inactive
(Manchester)	undet'd	abandon plt.	act. planning
(Oak Forrest)	7,000	abandon plt.	act. planning
(South Park)	5,000	abandon plt.	act. planning
(WCID #21)	undet'd	new plant	under const.
American Can Co.	undet'd	undet'd	
American Chain & Cable	undet'd	undet'd	
American Smelting & Ref.	undet'd	undet'd	
American Chem. Co.	undet'd	enlargement	inactive
Armour & Co.,Fertilizer Wks.	2,160	undet'd	
Atlas Hide Co.	40	undet'd	
Bolney Paper Felt Mill, Inc.	undet'd	additions	inactive
Bute, James Co.	undet'd	undet'd	
Cameron Iron Works			
(ind. waste)	undet'd	undet'd	
(san. sew.)	650	replacement	act. planning
Cederene Products Co.	undet'd	undet'd	
Chipman Chem. Co.	- - - -	undet'd	
Clairborne Gasoline Co.	undet'd	undet'd	
Crown Cork & Seal Co.	undet'd	undet'd	
Dedman Machine Co.	654	undet'd	
Eastern States Petroleum Co.			
Plant No. 1 (ind. waste)	undet'd	undet'd	
(san. sew.)	150	additions	inactive
Plant No. 2 (ind. waste)	10,200	undet'd	
(san. sew.)	200	additions	inactive
Eddy Refining Co.	undet'd	undet'd	
Ensco Co.	- - - -	undet'd	
Fidelity Products Mill	90	undet'd	
Fry, Lloyd A. Roofing Co.	undet'd	additions	inactive
General Portland Cement	- - - -	undet'd	
Glen Rose Gasoline Co.	undet'd	undet'd	
Gulf States Asphalt Co.	undet'd	undet'd	
Hammond Oil & Refining Co.	undet'd	undet'd	
Houston Brick & Tile Co.	35	additions	inactive
Houston Creosoting Co.	undet'd	enlargement	inactive
Houston Horse Meat Co.	undet'd	additions	act. planning
Houston Porcelain Products	- - - -	undet'd	
Houston Rendering Plant	30	undet'd	

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Houston Textile Mills	190	additions	inactive
Houston Todd (ind. waste)	- - - -	undet'd	
(san. sew.)	300	additions	inactive
Ideal Cement Co.			
(ind. waste)	- - - -	undet'd	
(san. sew.)	undet'd	undet'd	
Independent Oxygen Co.	undet'd	undet'd	
Industrial Cleaning & Painting	undet'd	new plant	inactive
Kolker Chemical Wks	undet'd	undet'd	
Koppers Co.(Wood Preserving)	735	replacement	undet'd
Lead Products Co.	- - - -	undet'd	
Lone Star Cement Co.			
(ind. waste)	- - - -	undet'd	
(san. sew.)	225	additions	inactive
McMillan, Earl (ind. waste)	undet'd	new plant	undet'd
(san. sew.)	50	additions	inactive
Magnet Cove Barium Corp.			
(ind. waste)	undet'd	undet'd	
(san. sew.)	10	additions	inactive
Magnolia AirCo. Co.	12	undet'd	
Magnolia Paper Co.	undet'd	undet'd	
Magnolia Provision Co.	25	undet'd	
Mathison Chem. Co.	- - - -	new plant	inactive
Merichem Corp. (ind. waste)	undet'd	undet'd	
(san. sew.)	40	undet'd	
Murray Rubber Co.	undet'd	undet'd	
Nyotex Chemical Co.			
(san. sew.)	90	additions	inactive
Oak Crest Provision Co.	2,040	undet'd	
Phillips Chemical Co.			
(ind. waste)	- - - -	undet'd	
(san. sew.)	250	undet'd	
Pittsburgh Plate Glass Co.			
(ind. waste)	- - - -	undet'd	
(san. sew.)	100	additions	inactive
Processes Limited			
(ind. waste)	undet'd	undet'd	
(san. sew.)	30	additions	inactive
San Jacinto Ordnance			
(ind. waste)	undet'd	undet'd	
(san. sew.)	undet'd	undet'd	
Saint Jo Paper Co.			
(ind. waste)	undet'd	undet'd	
(san. sew.)	55	additions	inactive
Secondary Metals			
(ind. waste)	- - - -	undet'd	
(san. sew.)	30	additions	inactive

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Lovelady	200	additions	inactive
Lovelady Canning Co.	undet'd	undet'd	
Mabank	630	add.&enlarg.	inactive
McKinney			
Plant No. 1	6,000	add.&enlarg.	inactive
Plant No. 2.	3,130	add.&enlarg.	inactive
Cabell's Inc.	undet'd	undet'd	
Texas Candy & Nut Co.	undet'd	undet'd	
Sautelax Cotton Oil Co.	undet'd	undet'd	
Madisonville	2,100	additions	inactive
Malakoff			
MidCo Gasoline Co.	undet'd	undet'd	
Malone	300	additions	inactive
Mansfield	980	replacement	act. planning
Mesquite	1,080	replacement	act. planning
Mexia	5,500	replacement	inactive
Mexia Textile Mills	undet'd	undet'd	
Swift & Co.	undet'd	undet'd	
Midlothian	980	additions	inactive
Producers Coop Mill	undet'd	undet'd	
Milford	550	additions	inactive
Muenster	600	enlargement	inactive
Oakwood	400	replacement	inactive
Palmer	470	additions	inactive
Pasadena	22,000	additions	act. planning
Champion Paper & Fiber Co.	undet'd	additions	act. planning
Crown Central Petroleum			
(ind. waste)	35,200	additions	act. planning
(san. sew.)	450	replacement	inactive
Mathison Chemical Co.			
(Acid Pl.) (ind. waste)	- - - -	undet'd	
(san. sew.)	25	additions	inactive
Mathison Chemical Co.			
(Fertilizer) (ind waste)	- - - -	additions	inactive
(san. sew.)	400	undet'd	
Rockwall	1,260	add.&enlarg.	inactive
Saint Jo	800	add.&enlarg.	inactive
Sanger	700	enlargement	act. planning
Seagoville	1,000	add.&enlarg.	inactive
Smithfield			
Strock Veneer Packing Co.	undet'd	undet'd	
South Houston	4,400	replacement	act. planning
Southside Place	1,500	enlargement	act. planning
Springtown			
Springtown Packing Co.	undet'd	undet'd	

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Sheffield Steel	378	additions	undet'd
Sinclair Oil Refining Co.	42,900	additions	act. planning
Smith, A. O. (Corp. of Tex.)	- - - -	additions	act. planning
Smith, A. O. (Houston Wks.)			
(ind. waste)	undet'd	undet'd	
(san. sew.)	650	replacement	inactive
Smith, Nowery J.	- - - -	new plant	inactive
Southern Acid & Sulphur Co.	3,720	undet'd	
Southern Drum Co.	- - - -	additions	inactive
South Texas Cotton Oil Co.	2,660	undet'd	
Superior Chem. Co.	undet'd	undet'd	
Swift & Co.	78	undet'd	
Syphert Packing Co.	50	undet'd	
Texas Creosoting Co.	undet'd	undet'd	
Trinity Portland Cement			
(san. sew.)	1,470	undet'd	
Tube-Kote Co. (ind. waste)	undet'd	undet'd	
(san. sew.)	45	undet'd	
United Creosoting Co.	510	additions	inactive
Uvalde Asphalt Co.	undet'd	undet'd	
Volney Pulp Mill	undet'd	additions	act. planning
Warren Petroleum Corp.	undet'd	undet'd	
Texas Railway Equip. Co.			
(san. sew.)	60	additions	inactive
Texas Shipbuilding Co.			
(san. sew.)	35	additions	inactive
Neal Meats Co.	undet'd	undet'd	
Custom Slaughters	undet'd	undet'd	
Hubbard	1,000	replacement	inactive
Humble	2,000	additions	act. planning
Italy	815	replacement	inactive
Kaufman	2,250	additions	inactive
Kemp	1,050	additions	inactive
Kerens	920	replacement	inactive
LaMarque	6,000	enlargement	final plans appro.
LaPorte	3,600	additions	under const.
DuPont, E. I. (ind. waste)	undet'd	undet'd	
(san. sew.)	300	replacement	inactive
Sinclair Rubber (ind. waste)	7,000	undet'd	
(san. sew.)	450	additions	undet'd
League City			
Terrell & Garth	undet'd	undet'd	
Leonard	795	additions	inactive
Lewisville	500	enlargement	under const.
Liberty	3,000	replacement	inactive
Stevens Food, Inc.	undet'd	undet'd	

TABLE L (continued)

Name and Location	Population Served	Improvements Needed	Remarks
Terrell	10,230	enlargement	act. planning
Texas City	16,000	new plant	under const.
Carbide & Carbon (ind waste)	300,000	additions	act. planning
(san. sew.)	1,500	additions	act. planning
Mansanto Chemical Co.			
(ind. waste)	undet'd	additions	act. planning
(san. sew.)	600	additions	act. planning
Pan American Refinery			
(ind. waste)	69,900	additions	act. planning
(san. sew.)	2,000	additions	inactive
Republic Oil Refinery			
(ind. waste)	undet'd	add.&enlarg.	act. planning
(san. sew.)	260	additions	inactive
Richardson, Sid, Oil Co.			
(ind. waste)	undet'd	additions	undet'd
(san. sew.)	120	additions	inactive
Texas City Refining Co.			
(ind. waste)	undet'd	undet'd	
(san. sew.)	115	additions	inactive
Longhorn Tin Processing Co.			
(ind. waste)	- - - -	additions	act. planning
(san. sew.)	825	additions	inactive
Stone Chemical Co.	undet'd	additions	act. planning
Texas City Heights	3,000	add.&enlarg.	act. planning
Tioga	335	additions	act. planning
Trinity	1,500	additions	act. planning
Van Alstyne	1,100	replacement	inactive
Venus	300	additions	inactive
Weatherford	7,000	replacement	inactive
Wortham	670	replacement	inactive
Wylie	1,000	replacement	inactive

APPENDIX "A"

BASIC DATA ON SOURCES OF MUNICIPAL* POLLUTION
TRINITY RIVER BASIN (Entirely within Texas) (January 1952)

Name and Location	Mile Above Mouth Outlet by Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
TIDEWATER									
Chambers County Home	0	75	75	secondary	sat.	sat.	12	none	
Trinity River Enters	0								
Cedar Bayou Enters	0								
Mont Belview	Ce-7	500	500	secondary	sat.	sat.	25	none	
Baytown (5 plants)	0								
Baytown Plant		24,000	24,000	primary	sat.	sat.	9,600	additions	act. planning
Goose Creek Plant				secondary	unsat.	sat.		enlarge	act. planning
Pelly Plant				primary	unsat.	sat.		replace	act. planning
Morrell Park Plant				secondary	unsat.	sat.		enlarge	act. planning
East James Plant				secondary	sat.	sat.		none	
San Jacinto River Enters	0								
Old River Enters	0								
Fresh Water Bayou Ent.	0-15								
Houston (WCID #21)	F-0	N	N	none	--	--	N	new plant	under const.
Buffalo Bayou Enters	0								
La Porte	0	3,600	3,600	primary	unsat.	unsat.	1,800	additions	under const.
Middle Bayou Enters	0								
Horsepen Bayou Enters	M-3								
Ellington Field	H-5	N	N	secondary	sat.	sat.	N	none	
Clear Creek Enters	0								
Pearland 2 mi to str.	C-17	400	400	secondary	sat.	sat.	40	none	
League City	C- 7	1,200	1,200	secondary	sat.	sat.	240	none	

N--Information undetermined or not available. neg--negligible

* Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns, significant institutions, recreational centers or other population centers.

** Includes industrial wastes discharged into municipal sewerage systems.

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Dickinson Bayou Enters	0								
Dickinson	D-5	800	800	primary	unsat.	sat	480	additions	act. planning
Texas City	0	16,000	16,000	none	- - -	- -	16,000	new plant	under const.
Texas City Heights	0	3,000	3,000	primary	unsat.	unsat.	220	additions& enlargement	Act. planning
Highland Bayou Enters	0								
Hitchcock	H-4	500	500	secondary	sat.	sat.	100	none	
La Marque-2 mi to str.	H-2	6,000	6,000	secondary	unsat.	sat.	2,400	enlargement	final plans ap
Galveston	0	70,000	70,000	none	- - -	- -	70,000	new plant	act. planning
Galveston Mun. Airport	0	2,600	2,600	secondary	sat.	unsat.	780	none	
Mustang Bayou Enters	0								
Alvin	M-21	3,050	3,050	secondary	unsat.	unsat.	150	additions	act. planning
TRINITY RIVER									
West Fork Enters	T-506								
Elm Fork Enters	T-506								
Dallas (2 plants)	T-500								
City Plant		483,700	611,200	secondary	unsat.	sat.	61,100	additions	under const.
Pleasant Grove Plant		11,200	11,200	secondary	N	sat.	1,120	N	
White Rock Creek Enters	T-496								
Richardson-4 mi to str.	W-18	1,240	1,240	secondary	sat.	sat.	125	none	
Parsons Slough Enters	T-466								
Seagoville-2 mi to str.	P-7	1,000	1,000	primary	unsat.	sat.	750	(additions &) (enlargement)	inactive
Federal Corrective Inst. (Seagoville)	P-7	N	N	secondary	sat.	sat.	N	none	
Red Oak Creek Enters	T-462								
East Fork Enters	T-460								
Rush Creek Enters	T-390								
Kerens - 1 mi to str.	R-9	920	920	primary	unsat.	unsat.	640	replacement	inactive
Cedar Creek Enters	T-386								

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Richland Creek Enters	T-372								
Tehuacana Creek Enters	T-347								
Walnut Creek Enters	T-342								
Fairfield	W-14	1,180	1,180	secondary	sat.	sat.	180	none	
Box Creek Enters	T-291								
Elkhart	B-14	420	420	primary	unsat.	unsat.	315	additions	inactive
Unnamed Creek Enters	T-287								
Oakwood	U-10	400	400	primary	unsat.	sat.	320	replacement	inactive
Upper Keechi Creek Ent.	T-273								
Buffalo Creek Enters	U-11								
Buffalo	B-15	750	750	secondary	sat.	N	75	none	
Elkhart Creek Enters	T-272								
Lower Keechi Creek Ent.	T-240								
Centerville	L-14	900	900	secondary	sat.	N	90	none	
Bedias Creek Enters	T-208								
Trinity-2 mi to str.	T-193	1,500	1,500	secondary	sat.	unsat.	600	additions	act. planning
Harmon Creek Enters	T-185								
Huntsville	H-15	5,500	5,500	secondary	sat.	sat.	825	none	
Sam Houston State Teachers College	H-15	1,400	1,400	secondary	sat.	sat.	140	none	
White Rock Creek Enters	T-170								
Kickapoo Creek Enters	T-155								
Groveton	K-23	1,000	1,000	primary	unsat.	unsat.	750	replacement	inactive
Long King Creek Enters	T-119								
Livingston	L-11	2,000	2,000	secondary	sat.	sat.	200	none	
Liberty	T-42	3,000	3,000	primary	unsat.	unsat.	2,550	replacement	inactive
Dayton-t mi to str.	T-37	1,020	1,020	primary	unsat.	sat.	800	replacement	under const.
WEST FORK OF TRINITY R.									
Loss Creek Enters	W-145								
Jacksboro	L-8	2,000	2,000	secondary	sat.	sat.	200	none	
Bridgeport	W-120	2,000	2,000	secondary	unsat.	sat.	1,000	additions	act. planning

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P. E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P. E. (B.O.D.) of Plant Effluent	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Clear Fork Enters	W-53								
Fort Worth (3 plants)	W-52								
City Plant		275,000	300,000	secondary	sat.	unsat.	30,000	enlarge	under const.
Richland Hills Plant		200	200	secondary	sat.	sat.	20	none	
Handley Plant		3,000	3,000	secondary	unsat.	unsat.	1,500	replacm't	inactive
Village Creek Enters	W-27								
Burleson	V-20	1,100	1,100	secondary	sat.	sat.	110	none	
Johnson Creek Enters	W-14								
Arlington	J-6	8,000	8,000	secondary	sat.	sat.	2,000	none	
Grand Prairie-1 mi to st.	W-13	15,700	15,700	secondary	unsat.	sat.	3,920	additions	under const.
Mountain Creek Enters	W-8								
Midlothian-5 mi to str.	M-20	980	980	primary	unsat.	sat.	735	additions	inactive
Walnut Creek Enters	M-12								
Mansfield	Wa-8	980	980	primary	unsat.	sat.	785	replacem't	act. planning
Delaware Creek Enters	W-4								
Irving	D-4	5,000	5,000	secondary	sat.	sat.	1,250	none	
CLEAR FORK OF WEST FORK									
Town Creek Enters	C-25								
Weatherford	T-11	7,000	7,000	secondary	unsat.	unsat.	5,600	replacm't	inactive
ELM FORK OF TRINITY R.									
Saint Jo	E-104	800	800	primary	unsat.	sat.	640	additions& enlargements	inactive
Muenster-6 mi to str.	E-88	600	600	primary	unsat.	sat.	390	enlargement	inactive
Gainsville	E-80	10,000	10,000	secondary	unsat.	unsat.	5,000	enlargement	under const.
Jordan Creek Enters	E-59								
Clear Creek Enters	E-51								
Sanger-3 mi to str.	C-12	700	700	secondary	unsat.	sat.	420	enlargement	act. planning
Hickory Creek Enters	E-27								
Denton-2 mi to str.	H-13	24,000	24,000	secondary	sat.	sat.	1,200	none	

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P. E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P. E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Prairie Creek Enters	E-25								
Lewisville	P-2	500	500	secondary	unsat.	sat.	250	enlarge	under const.
Stewart Creek Enters	E-25								
Frisco	S-11	460	460	primary	unsat.	unsat.	345	additions	inactive
Unnamed Creek Enters	E-22								
Carrollton	U-3	1,270	1,270	secondary	unsat.	sat.	635	additions& enlargements	inactive
Denton Creek Enters	E-19								
JORDAN CREEK OF ELM FORK									
Tioga-2 mi to str.	J-11	335	335	secondary	unsat.	sat.	220	additions	act. planning
Pilot Point-2 mi to str.	J-6	1,000	1,000	secondary	sat.	sat.	500	none	
DENTON CREEK OF ELM FORK									
Brushy Creek Enters	D-58								
Bowie	B-19	4,300	4,300	secondary	sat.	sat.	430	none	
Sandy Creek Enters	D-40								
Decatur	S-10	1,520	1,520	secondary	sat.	sat.	75	none	
Grapevine-3 mi to str.	D-9	1,200	1,200	secondary	unsat.	unsat.	400	replacement	act. planning
RED OAK CK. OF TRINITY R.									
Palmer	R-12	470	470	primary	unsat.	unsat.	360	additions	inactive
Ten Mile Cr. Enters	R-2								
Lancaster	T-18	2,270	2,270	secondary	sat.	sat.	570	none	
Ferris	T-11	1,500	1,500	primary	unsat.	unsat.	1,500	replacement	inactive
EAST FORK OF TRINITY R.									
Wilson Creek Enters	E-53								
Celina	W-21	785	785	secondary	unsat.	sat.	195	additions	inactive
McKinney (2 plants)	W-8								
Plant #1		6,000	6,000	secondary	unsat.	sat.	2,400	additions& enlargement	inactive
Plant #2		3,130	3,130	secondary	unsat.	sat.	1,560	additions& enlargement	Inactive
Pilot Creek Enters	E-41								

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P. E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
White Oak Creek Enters	E-35								
Rockwall	W-3	1,260	1,260	primary	unsat.	sat.	940	add.&enl.	inactive
Muddy Creek Enters	E-29								
Duck Creek Enters	E-27								
Garland	D-12	10,000	10,000	secondary	unsat.	sat.	5,000	additions	act. planning
South Mesquite Cr. Ent.	E-21								
Mesquite	S-7	1,080	1,080	secondary	unsat.	unsat.	810	replacement	act. planning
Buffalo Creek Enters	E-15								
Forney	B-8	1,180	1,180	secondary	sat.	sat.	110	none	
Crandall	B-0	400	400	secondary	sat.	sat.	40	none	
PILOT CREEK OF EAST FORK									
Bear Creek Enters	P-18								
Leonard	B-17	795	795	primary	unsat.	unsat.	600	additions	inactive
Sister Grove Cr. Enters	P-15								
Van Alstyne	S-22	1,100	1,100	primary	unsat.	unsat.	1,100	replacement	inactive
Elm Creek Enters	P-7								
Farmersville	E-9	1,660	1,660	primary	unsat.	unsat.	1,240	replacement	inactive
MUDDY CREEK OF EAST FORK									
Wylie	M-10	1,000	1,000	primary	unsat.	unsat.	1,000	replacement	inactive
Rowlett Creek Enters	M-4								
Plano	R-18	2,250	2,250	secondary	sat.	sat.	225	none	
CEDAR CREEK OF TRINITY R.									
Kings Fork Enters	C-39								
Terrell	K-17	10,230	10,230	secondary	unsat.	sat.	4,100	enlargement	act. planning
Kaufman	K-4	2,250	2,250	secondary	unsat.	unsat.	1,125	additions	inactive
Kemp	C-29	1,050	1,050	primary	unsat.	sat.	420	additions	inactive

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P. E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities Cap'y.	Adequacy of Treatment Facilities Opr.	P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
Ferris Fork Enters	C-24								
Wills Point	F-22	1,830	1,830	secondary	sat.	sat.	180	none	
Laceys Fork Enters	C-22								
Mabank-2 mi to str.	L-22	630	630	primary	unsat.	unsat.	410	additions& enlargements	inactive
Unnamed Creek Enters	C-3								
Athens	U-12	3,750	3,750	secondary	unsat.	unsat.	2,800	replacement	act. planning
RICHLAND CR OF TRINITY R.									
Ash Creek Enters	R-48								
Malone	A-7	300	300	primary	unsat.	unsat.	210	additions	inactive
Unnamed Creek Enters	R-37								
Dawson	U-5	635	635	secondary	sat.	sat.	95	none	
Unnamed Creek Enters	R-29								
Blooming Grove	Un-11	470	470	primary	unsat.	unsat.	350	additions	inactive
Pin Oak Creek Enters	R-25								
Hubbard	P-30	1,000	1,000	primary	unsat.	unsat.	900	replacement	inactive
Coolidge-4 mi to str.	P-18	600	600	primary	unsat.	unsat.	450	additions	inactive
Chambers Creek Enters	R-14								
CHAMBERS CR OF RICHLAND CR									
North Fork Enters	C-59								
South Fork Enters	C-59								
Grandview-1 mi to str.	S-14	500	500	secondary	unsat.	unsat.	200	additions	inactive
Italy-3 mi to str.	C-50	815	815	primary	unsat.	unsat.	815	replacement	inactive
Mill Creek Enters	C-37								
Milford	M-18	550	550	primary	unsat.	unsat.	410	additions	inactive
Frost-5 mi to str.	M-9	450	450	primary	unsat.	unsat.	450	replacement	inactive
Waxahachie Creek Enters	C-31								
Waxahachie	W-22	7,500	7,500	secondary	sat.	sat.	650	none	

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P. E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities Cap'y.	Adequacy of Treatment Facilities Opr.	P. E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status Of Municipal Action
Cummings Creek Enters	C-24								
Ennis (2 Plants)	CU-18								
Plant #1		3,250	3,250	secondary	sat.	sat.	500	none	
Plant #2		3,250	32,50	secondary	sat.	sat.	500	none	
Corsicana (2 Plants)									
4-mi to str.	C-22								
Plant #1	)	14,900	14,900	(secondary	unsat.	sat.)	3,730	none	
Plant #2	)			(primary	unsat.	sat.)		additions	final plans app.
NORTH FORK OF CHAMBERS CR.									
Alvarado	N-20	1,000	1,000	secondary	sat.	N	100	none	
Dry Creek Enters	N-6								
Venus	D-10	300	300	primary	unsat.	N	240	additions	inactive
Maypearl	N-4	300	300	secondary	sat.	sat.	30	none	
TEHUACANA CR OF TRINITY R.									
Wolf Creek Enters	T-36								
Wortham	W-3	670	670	primary	unsat.	sat.	580	replacement	inactive
Plummers Creek Enters	T-36								
Mexia	P-5	5,500	5,500	primary	unsat.	unsat.	4,950	replacement	inactive
Caney Creek Enters	T-22								
Teague	C-17	1,530	1,530	secondary	sat.	sat.	150	none	
ELKHART CREEK OF TRINITY R.									
Unnamed Creek Enters	E-9								
Grapeland-4 mi. to str.	U-6	900	900	secondary	unsat.	unsat.	450	enlargement	inactive
BEDIAS CREEK OF TRINITY R.									
Caney Creek Enters	B-14								
Town Branch Enters	C-8								
Madisonville	T-3	2,100	2,100	primary	unsat.	sat.	1,470	additions	inactive

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
WHITE ROCK CR OF TRINITY R.									
Gail Creek Enters	W-15								
Crockett	G-16	4,000	4,000	secondary	sat.	sat.	800	none	
Tantabogue Cr. Enters	W-10								
Lovelady-2 mi to str.	T-9	200	200	primary	unsat.	sat.	140	additions	inactive
SAN JACINTO RIVER									
East Fork Enters	S-27								
Cleveland	E-28	6,000	6,000	secondary	sat.	sat.	900	none	
West Fork Enters	S-27								
Highlands	S-4	2,000	2,000	primary	unsat.	unsat.	1,500	replacement	under const.
WEST FORK OF SAN JACINTO R.									
Town Creek Enters	W-31								
Conroe	T-5	5,000	5,000	secondary	sat.	sat.	650	none	
Unnamed Creek Enters	W-8								
Humble-1 mi to str.	U-5	2,000	2,000	secondary	unsat.	sat.	600	additions	act. planning
BUFFALO BAYOU									
Katy	B-55	1,400	1,400	secondary	sat.	N	140	none	
Spring Branch Enters	B-31								
Houston (Pine Terrace)	- -	200	200	secondary	sat.	sat.	16	none	
Houston (Ridgecrest Addition)	Sp-3	800	800	secondary	sat.	sat.	40	none	
Houston (Saddle Brook Addition)	- -	100	100	secondary	sat.	sat.		none	
Houston (Westview Terrace)	B-30	2,110	2,110	secondary	sat.	sat.	320	none	
Houston (WCID#15)	B-28	800	800	secondary	sat.	sat.	80	none	
White Oak Bayou Enters	B-22								
Houston (North Side Plant)	B-19	200,000	200,000	secondary	sat.	sat.	33,800	none	

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Houston(Magnolia Plant)	B-16	10,000	10,000	secondary	unsat.	sat.	2,500	abandon	active plan
Brays Bayou Enters	B-14								
Simms Bayou Enters	B-12								
Houston(Chocolate Bayou Est.)	S-10	1,000	1,000	secondary	sat.	sat.	40	none	
Houston(Sunnyside Gardens)	S-10	450	450	secondary	sat.	sat.	90	none	
Houston (South Park) 3 mi. to S.	S-9	5,000	5,000	secondary	sat.	sat.	500	abandon	active plan
Houston(Garden Villas)	S-6	5,000	5,000	secondary	unsat.	sat.	2,000	abandon	inactive
Berry's Bayou Enters	S-3								
South Houston	Be-3	4,400	4,400	primary	unsat.	unsat.	3,300	replacement	active plan
Houston (Simms Bayou Plant)	S-2	200,000	200,000	secondary	unsat.	sat.	27,300	enlargement	act. planning
Houston(Manchester)	S-1	N	N	primary	unsat.	sat.	N	abandon	active plan
Panther Creek Enters	B-11								
Houston (Clinton Park)	P-4	3,700	3,700	secondary	unsat.	sat.	1,300	abandon	active plan
Galena Park	P-1	8,000	8,000	secondary	unsat.	unsat.	3,200	additions& enlargement	under const.
Vinces Bayou Enters	B-1								
Pasadena	V-1	22,000	22,000	secondary	sat.	sat.	2,200	additions	act. planning
Hunting Bayou Enters	B-8								
Houston (Stannard Place)	H-12	300	300	secondary	sat.	sat.	30	none	
Houston (WCID#20)	--	1,000	1,000	secondary	sat.	sat.	100	none	
Houston (Pt. Houston)	H-5	2,000	2,000	secondary	sat.	sat.	500	none	
3 mi. to S.									
Houston (Homestead Add.)	--	175	175	secondary	sat.	sat.	18	none	
Jacinto City	H-5	10,300	10,300	secondary	sat.	sat.	1,030	none	
Greens Bayou Enters	B-5								
Unnamed Creek Enters	B-3								
Deer Park	U-3	800	800	secondary	sat.	sat.	160	none	
Carpenter Bayou Enters	B-1								

APPENDIX "A" (continued)

Name and Location	Mile Above Mouth Outlet Stream	Population Served by Sewers	P.E. (B.O.D.) Untreated Waste**	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) of Plant Effluent**	Treatment Needs	Current Status of Municipal Action
					Cap'y.	Opr.			
Houston(Marwood Add.)	C-5	210	210	secondary	sat.	sat.	55	none	
San Jacinto Ordnance Plant #1	--	N	N	secondary	sat.	sat.	N	none	
San Jacinto Ordnance Plant #2	--	N	N	secondary	sat.	sat.	N	none	
WHITE OAK BAYOU OF BUFFALO BAYOU									
Houston (Oak Forest)	W-7	7,000	7,000	secondary	unsat.	sat.	2,300	abandon	active plan
Little White Oak Bayou Enters	W-1								
Houston (North Park)	L-6	60	60	secondary	sat.	sat.	9	none	
Houston (Meadow Lea) 1 mi to S.	L-4	200	200	secondary	sat.	sat.	30	none	
Houston (WCID#10)	L-4	4,000	4,000	secondary	sat.	sat.	400	none	
Houston (Garden City Park)	--	75	75	secondary	sat.	sat.	8	none	
BRAYS BAYOU OF BUFFALO BAYOU									
Bellaire-1 mi to Str.	B-13	12,000	12,000	secondary	sat.	sat.	1,200	none	
Houston(Westwood)	--	4,500	4,500	secondary	sat.	N	450	none	
S. Side Place-1 mi to Str.	B-12	1,500	1,500	secondary	sat.	unsat.	300	enlarge	act. planning
W. Univ. Place 1 mi. to Str.	B-11	18,000	18,000	secondary	sat.	sat.	1,800	none	
Poor Farm Gully Enters	B-11								
Houston (Lamar Ter.) 1 mi to S.	P-5	1,000	1,000	secondary	sat.	sat.	80	none	
GREENS BAYOU OF BUFFALO BAYOU									
Halls Bayou Enters	G-10								
Houston (Chatwood)	--	3,000	3,000	secondary	sat.	N	300	none	
Houston (Greenfield Add)	H-12	375	375	secondary	sat.	sat.	38	none	
Houston (Greenwood Vil.)	--	20	20	secondary	sat.	sat.		none	
Houston (Pinewood Vil.)	--	50	50	secondary	sat.	sat.		none	
Houston (Hawthorne Pl.)	H-11	900	900	secondary	sat.	sat.	180	none	
Houston(Home Owned Est.)	G-11	650	650	secondary	sat.	sat.	65	none	

APPENDIX "B"
TABLE I
BASIC DATA ON SOURCES OF INDUSTRIAL* WASTES
TRINITY RIVER BASIN (Entirely within Texas) (January 1952)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Opr.			
TIDEWATER									
Trinity River Enters	0								
Baytown	0								
General Tire & Rubber Co.									
(ind. waste)		rubber	organic	sec.	uns	sat	N	addition	act. planning
(san. sew.)		rubber	san.sew.	sec.	sat	sat	16	none	
Humble Oil Co.									
(ind. waste)		petroleum	org.inorg.	sec.	sat	sat	N	none	
(san. sew.)		petroleum	san.sew.	sec.	sat	sat	N	none	
San Jacinto River Enters	0								
Buffalo Bayou Enters	0								
La Porte									
Du Pont, E. I.									
(ind. waste)		chemical	org.inorg.	minor	uns	uns	N	N	
(san. sew.)		chemical	san. sew.	pri	uns	uns	225	replace	inactive
Goodyear Synthetic Rubber									
(ind. waste)		rubber	org.inorg	sec.	sat	sat	4,000	none	
(san. sew.)		rubber	san.sew.	sec.	sat	sat	20	none	
Sinclair Rubber Co.									
(ind. waste)		rubber	org.inorg	pri.	N	N	7,000	N	
(san. sew.)		rubber	san.sew.	pri.	uns	uns	225	addition	N
Clear Creek Enters	0								
Friendswood	C-11								
Cecil Brown Fig Co.		food	org.	sec.	sat	sat	0	none	
League City	C-7								
Terrel & Garth		food	org.inorg.	none			N	N	

N--Information undetermined or not available.
*Industries having separate outlets and discharging directly to watercourse.

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y.	Opr.			
Dickinson Bayou Enters	0								
Dickinson	D-5								
Adams-Heaner Co.		food	organic	none			N	N	
Mineral Oil Refining Co.		chemical	org.inorg	none			N	connect to city sewer	under const.
Texas City	0								
Carbide and Carbon									
(ind. waste)		chemical	org.inorg	intr	uns	sat	300,000	addition	act. planning
(san. sew.)		chemical	san.sew.	pri.	uns	sat	1,500	addition	act. planning
Monsanto Chemical Co.									
(ind. waste)		chemical	org.inorg	minor	uns	sat	N	addition	act. planning
(san. sew.)		chemical	san.sew.	pri.	uns	sat	450	addition	act. planning
Pan American Refinery									
(ind. waste)		petroleum	org.inorg	pri.	uns	sat	69,900	addition	act. planning
(san. sew.)		petroleum	san. sew.	pri.	uns	sat	1,500	addition	inactive
Republic Oil Refinery									
(ind. waste)		petroleum	org.inorg	pri.	uns	sat	N	addition & enlarge	act. planning
(san. sew.)		petroleum	san. sew.	pri.	uns	sat	260	addition	inactive
Richardson, Sid, Oil Co.									
(ind. waste)		petroleum	org.inorg	pri.	uns	sat	N	addition	N
(san. sew.)		petroleum	san. sew.	pri.	uns	sat	80	addition	inactive
Texas City Refining Co.									
(ind. waste)		petroleum	org.inorg	pri.	N	N	N	N	
(san. sew.)		petroleum	san. sew.	pri.	uns	N	90	addition	inactive
Longhorn Tin Processing Co.									
(ind. waste)		pri.metals	inorg	sec.	uns.	N	---	addition	act. planning
(san. sew.)		pri.metals	san. sew.	pri.	uns	sat	605	addition	inactive
Stone Chemical Co.		chemical	org.inorg	pri	uns	uns	N	addition	act. planning

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr			
Galveston	0								
Dickson Weather Proof Nail Co.		fab.metals	inorg	none			---	connect to city sewer	act. planning
Farmers Marine Copper Works		fab.metals	inorg	N	N	N	---	N	
Gulf Rendering Co.		food	organic	N	N	N	N	N	
High Grade Packing Co.		food	organic	Pri	uns	uns	N	addition	inactive
Mustang Bayou Enters	0								
Alvin	M-21								
Leverton Cannery		food	organic	intr	sat	sat	N	none	
Phillips Petroleum Co.		petroleum	org.inorg	N	N	N	N	N	
TRINITY RIVER									
West Fork Enters	T-506								
Elm Fork Enters	T-506								
Dallas	T-500								
Armour Fertilizer Works		chemical	organic	sec	sat	sat	0	none	
Armstrong Cork Co.		misc.	san.sew.	sec	sat	sat	N	none	
Eagle Picher Co. of Texas		pri.metals	san.sew.	sec	sat	sat	10	none	
Glitsch, Fritz W., and Sons		fab.metals	san.sew.	sec	sat	sat	0	none	
Chance Vaught Aircraft Corp.									
(ind. waste)		fab.metals	org.inorg	none			N	N	
(san. sew.)		fab.metals	san.sew.	sec	sat	sat	20	none	
Texas Engineering & Mfg. Co.									
(ind. waste)		fab.metals	org.inorg	none			N	N	
(san. sew.)		fab.metals	san.sew.	sec	sat	sat	0	none	
National Lead Co.		pri.metals	san.sew.	sec	sat	sat	0	none	
Ruberoid Mfg. Co.									
(ind. waste)		chemical	organic	sec	sat	sat	0	none	
(san. sew.)		chemical	san.sew.	sec	sat	sat	0	none	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr.			
Werson Mfg. Co.		chemical	san.sew.	sec	sat	sat	0	none	
Trinity Portland Cement Co.		misc.	san.sew.	sec	sat	sat	0	none	
Lone Star Cement Co.		misc.	san.sew.	sec	sat	sat	0	none	
East Fork Enters	T-460								
Cedar Creek Enters	T-386								
Richland Creek Enters	T-372								
Techuacana Creek Enters	T-347								
Elkhart Creek Enters	T-272								
White Rock Creek Enters	T-170								
Liberty	T-42								
Stevens Food Inc.		food	organic	N	N	N	N	N	
WEST FORK OF TRINITY RIVER									
Walnut Creek Enters	W-65								
Springtown	Wa-12								
Springtown Packing Co.		food	organic	N	N	N	N	N	
Fort Worth	W-52								
General Portland Cement									
(ind. waste)		misc.	inorganic	none			---	N	
(san. sew.)		misc.	san.sew.	pri.	sat	sat	N	none	
Marine Air Corp.		fab.metals	org.inorg	sec.	sat	sat	N	none	
Premier Oil Ref. Co.									
(ind waste)		petroleum	org.inorg	minor	N	N	N	N	
(san.sew.)		petroleum	san.sew.	pri.	sat	sat	N	none	
Consolidated Chemical		chemical	san.sew.	sec	sat	sat	0	none	
Gulf Refining Co.		petroleum	org.inorg	sec	sat	sat	N	none	
Magnolia Pet. Co.									
(ind. waste)		petroleum	org.inorg	sec	sat	sat	0	none	
(san.sew.)		petroleum	san.sew.	sec	sat	sat	0	none	
Lancaster Corp.		lumber	organic	sec	sat	sat	N	none	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures: Degree	Adequacy: Cap'y	Adequacy: Opr	P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
American Mfg. Co.		fab.metal	org-inorg	pri	uns	uns	N	connect to city sewers	act. planning
White Lake Dairy		food	organic	sec	sat	sat	0	none	
Calloway Branch Enters	W-26								
Smithfield	C-8								
Strock Veneer Packing Co.		lumber	organic	N	N	N	N	N	
Mountain Creek Enters	W-8								
Midlothian	M-20								
Producers Coop. Mill		food	organic	N	N	N	N	N	
ELM FORK OF TRINITY RIVER									
Gainesville	E-80								
Chaffin Packing Co.		food	organic	N	N	N	N	N	
Tydol Refinery		petroleum	org-inorg	N	N	N	N	N	
Hickory Creek Enters	E-27								
Denton	E-13								
Denton Dairy Coop.		food	san.sew.	pri	sat	sat	N	none	
Denton Rendering Co.		food	organic	sec	sat	sat	0	none	
Denton Creek Enters	E-19								
DENTON CREEK OF ELM FORK									
Grapevine	D-9								
Wrights Veneer Factory		lumber	organic	N	N	N	N	N	
EAST FORK OF TRINITY RIVER									
Wilson Creek Enters	E-53								
McKinney	W-8								
Cabell's Inc.		food	organic	sec	N	N	N	N	
Texas Candy and Nut Co.		food	organic	N	N	N	N	N	
Sautelax Cotton Oil Co.		food	org-inorg	N	N	N	N	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr.			
Pilot Creek Enters	E-41								
Duck Creek Enters	E-27								
Garland	D-12								
Peterman, George, Meat Co.		food	organic	sec	sat	N	N	none	
PILOT CREEK OF EAST FORK									
Elm Creek Enters	P-7								
Farmersville	E-9								
McGraw Candies Inc.		food	organic	N	N	N	N	N	
CEDAR CREEK OF TRINITY RIVER									
Unnamed Creek Enters	C-3								
Athens	U-12								
Athens Canning Co.		food	organic	N	N	N	N	N	
Vander Meers Locker Ser.		food	organic	N	N	N	N	N	
Malakoff	U-2								
Mid-Co Gasoline Co.		petroleum	org-inorg	N	N	N	N	N	
RICHLAND CREEK OF TRINITY RIVER									
Chambers Creek Enters	R-14								
Cummings Creek Enters	C-24								
Ennis	Cu-18								
American Carbon Paper Co.		paper	inorg	minor	sat	sat	--	none	
Planters Cotton Oil Mill		food	org-inorg	N	N	N	N	N	
Sani-Wax Co.		chemical	N	N	N	N	N	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr.			
Corsicana	C-22								
Cream Crest Dairies		food	org	N	N	N	N	N	
Dixie Velvet Ice Cream Co.		food	org	N	N	N	N	N	
Keen's of Texas Inc.		food	org	N	N	N	N	N	
Mid-Co Gasoline Co.		petroleum	N	N	N	N	N	N	
TEHUACANA CREEK OF TRINITY RIVER									
Plummers Creek Enters	T-36								
Mexia	P-5								
Mexia Textile Mills		textile	org-inorg	N	N	N	N	N	
Swift and Co.		food	org	N	N	N	N	N	
ELKHART CREEK OF TRINITY RIVER									
Unnamed Creek Enters	E-9								
Grapeland	U-6								
Lone Star Producing Co.		petroleum	N	N	N	N	N	N	
WHITE ROCK CREEK OF TRINITY RIVER									
Tantabogue Creek Enters	W-10								
Love Lady	T-9								
Love Lady Canning Co.		food	org	N	N	N	N	N	
SAN JACINTO RIVER									
East Fork Enters	S-27								
Cleveland	E-28								
Cleveland Veneer Co.		lumber	org	N	N	N	N	N	
Grimes Veneering Mill		lumber	org	N	N	N	N	N	
Mathews-Johnson Veneer & Panel Co.		lumber	org	N	N	N	N	N	
Cleveland Creosoting Co.		chemical	N	N	N	N	N	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr.			
West Fork Enters	S-27								
WEST FORK OF SAN JACINTO RIVER									
Town Creek Enters	W-31								
Conroe	T-5								
Columbia Carbon Co.		chemical	N	N	N	N	N	N	
Conroe Creosoting Co.		chemical	N	N	N	N	N	N	
Humble Oil & Refining Co.		petroleum	org-inorg	N	N	N	N	N	
Midland Gasoline Co.		petroleum	org-inorg	N	N	N	N	N	
Superior Oil Co.		petroleum	org-inorg	N	N	N	N	N	
Spring Creek Enters	W-11								
Cypress Creek Enters	S-3								
CYPRESS CREEK OF SPRING CREEK	C-34								
Unnamed Creek Enters	U-11								
Waller									
Canterberry Farms		food	org	pri	sat	sat	N	none	
Little Cypress Creek Enters	C-24								
Hockley	L- 4								
United Salt Corp.		mining	inorg	none				N	
BUFFALO BAYOU									
White Oak Bayou Enters	B-22								
Brays Bayou Enters	B-14								
Sims Bayou Enters	B-12								
Panther Creek Enters	B-11								
Galena Park	P-1								
Drumex Corp.		misc.	org-inorg	pri	uns	uns	N	replace	N

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Adequacy Opr.			
Vinces Bayou Enters	B-11								
Pasadena	V-1								
Champion Paper and Fiber Co.		paper	org-inorg	pri	uns	sat	N	addition	act. planning
Crown Central Petroleum									
(ind. waste)		petroleum	org-inorg	pri	uns	sat	35,200	addition	act. planning
(san. sew.)		petroleum	san.sew.	pri	uns	sat	340	replace	inactive
Lubrizol									
(ind. waste)		chemical	org-inorg	sec	sat	sat	120	none	
(san. sew.)		chemical	san.sew.	sec	sat	sat	13	none	
Mathison Chem. Co.- Acid Plant									
(ind. waste)		chemical	inorg	none			---	N	
(san.sew.)		chemical	san.sew.	pri	uns	N	18	addition	inactive
Mathison Chem. Co.- Fertilizer Plant									
(ind. waste)		chemical	inorg	pri	uns	sat	---	addition	inactive
(san.sew.)		chemical	san.sew.	sec	N	sat	200	N	
Hunting Bayou Enters	B-8								
Greens Bayou Enters	B-5								
Unnamed Creek Enters	B-3								
Deer Park	J-3								
Diamond Alkali Corp.									
(ind. waste)		chemical	inorg	pri	sat	sat	---	none	
(san.sew.)		chemical	san.sew.	pri	uns	sat	225	addition	inactive
Rohm & Haas (ind. waste)		chemical	org-inorg	pri	uns	N	N	N	
(san. sew.)		chemical	san.sew.	pri	uns	sat	90	N	
Shell Oil Co.									
(ind. waste)		petroleum	org-inorg	intr	uns	uns	35,000	N	
(san.sew.)		petroleum	san.sew.	pri	N	N	1,910	N	
Shell Chemical Co.		chemical	org-inorg	pri	sat	sat	N	none	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures Degree	Adequacy Cap'y	Adequacy Opr.	P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
Houston									
American Can Co.		fab.metal	N	none			N	N	
American Chain & Cable Co.		fab.metal	N	N	N	N	N	N	
American Smelting & Ref. Co.		pri.metal	N	N	N	N	N	N	
Armour & Co.-Fertilizer Wks		misc.	org	N	N	N	2,160	N	
Asbestos Co. of Texas									
(ind. waste)		misc.	inorg	pri	sat	sat	---	none	
(san. sew.)		misc.	san.sew.	sec	sat	sat	0	none	
Bolney Paper Felt Mill Inc.		paper	org-inorg	pri	uns	uns	N	addition	inactive
Bute, James, Co.		chemical	N	N	N	N	N	N	
Cameron Iron Wks.									
(ind. waste)		fab.metal	org-inorg	minor	uns	uns	N	N	
(san.sew.)		fab.metal	san.sew.	pri	uns	uns	485	replace	act. planning
Claiborne Gasoline Co.		petroleum	N	N	N	N	N	N	
Crown Cork and Seal Co.		misc.	N	N	N	N	N	N	
Eastern States Pet.Co.Plt.#1									
(ind. waste)		petroleum	org-inorg	pri	uns	sat	N	N	
(san.sew.)		petroleum	san.sew.	pri	uns	N	110	addition	inactive
Eastern States Pet.Co.Plt.#2									
(ind. waste)		petroleum	org-inorg	pri	uns	sat	10,200	N	
(san.sew.)		petroleum	san.sew.	pri	uns	N	150	addition	inactive
Ensco Co.		fab.metal	inorg	N	N	N	---	N	
Fry, Lloyd A., Roofing Co.		paper	org-inorg	pri	uns	uns	N	addition	inactive
General Portland Cement Co.		misc.	inorg	N	N	N	---	N	
Glen Rose Gasoline Co.		petroleum	N	N	N	N	N	N	
Gulf Brewing Co.		food	org	sec	sat	sat	3,120	none	
Hammond Oil & Refining Co.		petroleum	N	N	N	N	N	N	
Houston Brick and Tile Co.		misc.	san.sew.	pri	uns	N	27	addition	inactive
Houston Horse Meat Co.		food	org	minor	uns	sat	N	addition	act. planning

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Opr.			
Houston Oxygen Co.		chemical	inorg	pri	sat	sat	---	none	
Houston Porcelain ProductsCo.									
(Ind. waste)		misc.	inorg	pri	N	N	---	N	
(san.sew.)		misc.	san.sew.	sec	sat	sat	neg	none	
Houston, Todd (ind. waste)		fab.metal	inorg	N	N	N	---	N	
(san.sew.)		fab.metal	sar.sew.	pri	uns	N	225	addition	inactive
Humble Oil & Ref. Co. Spec. Prod.		petroleum	org-inorg	sec	sat	sat	N	none	
Ideal Cement Co.									
(ind. waste)		misc.	inorg	none			---	N	
(san.sew.)		misc.	san.sew.	N	N	N	N	N	
Independent Oxygen Co.		chemical	N	N	N	N	N	N	
Industrial Cleaning & Painting		chemical	org-inorg	minor	uns	uns	N	new plant	inactive
Koppers Co. - Wood Preserving Div.		chemical	org-Inorg	minor	uns	uns	735	replace	N
Lead Products Co.		fab.metal	inorg	pri	N	N	---	N	
Lone Star Cement Co.									
(ind. waste)		misc.	inorg	N	N	N	---	N	
(san.sew.)		misc.	san.sew.	pri	uns	N	170	addition	inactive
Murray Rubber Co.		rubber	org-inorg	none			N	N	
Phillips Chemical Co.									
(ind. waste)		chemical	inorg	none			---	N	
(san.sew.)		chemical	san.sew.	pri	uns	N	190	N	
Pittsburgh Plate Glass Co.									
(ind. waste)		chemical	inorg	none			---	N	
(san.sew.)		chemical	san.sew.	pri	uns	N	75	addition	inactive
Processes Ltd. (ind. waste)		petroleum	org-inorg	pri	N	N	N	N	
(san. sew.)		petroleum	san.sew.	pri	uns	N	23	addition	inactive

neg--negligible.

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy Cap'y	Opr.			
San Jacinto Ordnance									
(ind. waste)		chemical	N	N	N	N	N	N	
(san.sew.)		chemical	san.sew.	sec	N	N	N	N	
Secondary Metals									
(ind. waste)		fab.metal	inorg	N	N	N	---	N	
(san.sew.)		fab.metal	san.sew.	pri	uns	N	24	addition	inactive
Sheffield Steel Co.									
(ind. waste)		pri.metal	org-inorg	minor	uns	N	N	addition	N
(san.sew.)		pri.metal	san.sew.	sec	sat	sat	378	none	
Sinclair Oil Refining Co.		petroleum	org-inorg	pri	uns	sat	42,900	addition	act. planning
Smith, Nowery J.									
(ind. waste)		chemical	inorg	minor	uns	uns	---	new plant	inactive
(san.sew.)		chemical	san.sew.	sec	sat	sat	0	none	
Southern Acid & Sulphur Co.		chemical	org-inorg	N	N	N	3,720	N	
Southern Drum Co.		misc.	inorg	minor	uns	uns	---	addition	inactive
Superior Chemical Co.		chemical	N	N	N	N	N	N	
Volney Pulp Mill		paper	org-inorg	intr	uns	uns	N	addition	act. planning
Warren Petroleum Corp.		petroleum	N	N	N	N	N	N	
Neal Meats Co.		food	org	N	N	N	N	N	
Custom Slaughterers		food	org	N	N	N	N	N	
WHITE OAK BAYOU OF BUFFALO BAYOU									
Unnamed Creek Enters	W-10								
Fairbanks	U-4								
Columbia Carbon Co.									
(ind. waste)		chemical	inorg	pri	N	N	---	N	
(san.sew.)		chemical	san.sew.	sec	sat	sat	neg	none	
Distillate Products Co.									
(ind. waste)		petroleum	org-inorg	N	N	N	N	N	
(san.sew.)		petroleum	san.sew.	sec	sat	sat	neg	none	
Warren Petroleum Corp.		petroleum	N	N	N	N	N	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures			P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Adequacy				
					Cap'y	Opr.			
Little White Oak Bayou									
Enters	W-1								
Houston									
Dedman Machine Co.		fab.metals	org-inorg	none			654	N	
Houston Textile Mills		textile	org	pri	uns	sat	190	addition	inactive
McMillian, Earl									
(ind. waste)		misc.	org-inorg	none			N	new plant	N
(san.sew.)		misc.	san.sew.	pri	uns	uns	40	addition	inactive
Texas Creosoting Co.		chemical	N	N	N	N	N	N	
Trinity Portland CementCo.		misc.	san.sew.	N	N	N	1,470	N	
Houston									
Cederene Products Co.		chemical	N	N	N	N	N	N	
Chipman Chemical Co.		chemical	inorg	pri	N	N	---	N	
Cook Paint Co.		chemical	org-inorg	pri	sat	sat	318	none	
Fidelity Products Mill		food	org	N	N	N	90	N	
Houston Creosoting Co.		chemical	org-inorg	pri	uns	sat	N	enlarge	inactive
Magnolia Paper Co.		paper	org	N	N	N	12	N	
Saint Jo Paper Co.									
(ind. waste)		paper	org-inorg	none			N	N	
(san.sew.)		paper	san.sew.	pri	uns	uns	40	addition	inactive
Swift and Co.		food	org	N	N	N	78	N	
United Creosoting Co.		chemical	org	pri	uns	sat	510	addition	inactive
Uvalde Asphalt Co.		petroleum	org-inorg	N	N	N	36	N	
BRAYS BAYOU OF BUFFALO BAYOU									
Houston									
Eddy Refining Co.		petroleum	N	N	N	N	N	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures Degree	Adequacy Cap'y	Adequacy Opr.	P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
SIMMS BAYOU OF BUFFALO BAYOU									
Houston									
Gulf State Asphalt Co.		petroleum	org-inorg	none			N	N	
Magnet Cove Barium Corp.									
(ind. waste)		chemical	org-inorg	none			N	N	
(san.sew.)		chemical	san.sew.	sec	uns	N	neg	addition	inactive
Tube-Kote Co. (ind. waste)		chemical	org-inorg	none			N	N	
(san.sew.)		chemical	san.sew.	pri	uns	N	11	N	
HUNTING BAYOU OF BUFFALO BAYOU									
Houston									
Atlas Hide Co.		leather	org	N	N	N	41	N	
Houston Rendering Plant		food	org	N	N	N	27	N	
Magnolia AirCo Co.		chemical	org	N	N	N	12	N	
Magnolia Provision Co.		food	org	N	N	N	24	N	
Mathison Chem. Co.-									
Sulphur and insecticides		chemical	inorg	none			---	new plant	inactive
Oak Crest Provision Co.		food	org	minor	N	N	2,040	N	
Smith, A.O., Houston Works									
(ind. waste)		fab.metal	N	none			N	N	
(san.sew.)		fab.metal	san.sew.	pri	uns	N	490	replace	inactive
South Texas Cotton Oil Co.		food	org	N	N	N	2,656	N	
GREENS BAYOU OF BUFFALO BAYOU									
Houston									
Kolker Chemical Wks.									
(ind. waste)		chemical	org-inorg	minor	N	N	N	N	
(san.sew.)		chemical	san.sew.	pri	sat	sat	12	none	
Merichem Corp. (ind. waste)		chemical	org-inorg	none			N	N	
(san. sew)		chemical	san.sew.	none			40	N	

APPENDIX "B" (continued)

Name and Location	Miles Above Mouth Outlet Stream	Type of Industry	Type of Waste Produced	Treatment or Other Pollution Control Measures	Adequacy		P.E. (B.O.D.) of Plant Effluent	Pollution Abatement Needs	Current Status of Industrial Action
				Degree	Cap'y	Opr.			
Nyotex Chemical Co.									
(ind. waste)		chemical	org-inorg	pri	sat	sat	N	none	
(san.sew.)		chemical	san.sew.	pri	uns	N	70	addition	inactive
American Chemical Co.		chemical	org-inorg	pri	uns	uns	N	enlarge	inactive
Smith, A.O. Corp of Texas									
(ind. waste)		fab.metal	inorg	pri	uns	N	---	addition	act. planning
(san. sew.)		fab.metal	san.sew.	sec	sat	sat	85	none	
Syphert Packing Co.		food	org	N	N	N	53	N	
Texas Railroad Equipment Co.		fab.metal	san.sew.	pri	uns	N	45	addition	inactive
Texas Shipbuilding Co.		fab.metal	san.sew.	pri	uns	N	27	addition	inactive

Abbreviations and symbols

N--Information undetermined or not available.

Type of waste produced:
org--organic
inorg--inorganic
san. sew. -- sanitary sewage

Degree of treatment:
pri -- primary
sec -- secondary
intr-- intermediate

Adequacy of treatment, capacity and operation:
sat--satisfactory
uns--unsatisfactory

Types of industries

Food and kindred products
Textile mill products
Lumber and wood products
Paper and allied products
Chemicals and allied products
Petroleum and coal products
Rubber and rubber products
Leather and leather products
Primary metal industries
Fabricated metal industries
Miscellaneous industries

APPENDIX B - TABLE 2
INDUSTRIAL WASTE DATA
OIL FIELD SALT WATER DISPOSAL WELLS CONSTRUCTED 1947 through 1951 in the TRINITY RIVER BASIN

County and Owner	Oil Field	Wastes treated before injection	Method of injection	Waste injected (in 1000 gallons per day)	Year Well Completed
ANDERSON					
Amerada	Cayuga	no	grav.*	13	1947
"Tex" Harvey Oil Co.	E. Long Lake	no	grav.	59	1948
Tidewater Assoc.	Cayuga	no	grav.	273	1949
BRAZORIA					
J. S. Abercrombie Co.	Manvel	no	grav.	11	1949
Humble Oil & Ref. Co.	Hastings	no	grav.	143	1947
" " " " "	Rowan	no	grav.	50	1948
" " " " "	Hastings	yes	grav.	210	1948
" " " " "	Danbury Dome	no	grav.	101	1949
" " " " "	Hastings	yes	grav.	55	1950
" " " " "	"	no	grav.	210	1950
" " " " "	Liverpool	no	grav.	63	1950
" " " " "	Hastings	yes	grav.	139	1951
" " " " "	"	yes	grav.	210	1951
Phillips Petroleum Co.	Chocolate Bayou	no	grav.	15	1948
Stanolind Oil & Gas Co.	Hastings	no	pres.	147	1947
" " " "	"	no	pres.	84	1947
" " " "	"	no	pres.	294	1948
" " " "	"	no	pres.	294	1948
" " " "	"	no	pres.	N	1948
" " " "	"	no	pres.	168	1948
" " " "	"	N	N	N	1949
" " " "	Chocolate Bayou	no	pres.	15	1949
" " " "	Hastings	no	pres.	168	1951
" " " "	"	no	pres.	294	1951
" " " "	"	no	pres.	336	1951
The Texas Co.	Chocolate Bayou	yes	pres.	13	1951
" " "	" "	yes	pres.	50	1951
Wm. S. Thompson	Manvel Miocene	no	grav.	38	1950
CHAMBERS					
Continental Oil Co.	Anahuac	no	grav.	38	1950
" " "	"	no	grav.	15	1951
J. M. Frost et. al.	Fig Ridge	yes	pres.	7	1947

*NOTE--Following abbreviations used:
grav. -- gravity
pres. -- pressure
N--information not available or unknown

Gulf Oil Corp.	Anahuac	yes	grav.	29	1951
Humble Oil & Ref. Co.	"	no	grav.	126	1947
" " "	"	no	grav.	55	1947
" " "	"	no	grav.	42	1947
" " "	"	no	grav.	50	1947
" " "	"	no	grav.	126	1948
" " "	"	no	grav.	126	1948
" " "	"	no	grav.	84	1948
" " "	"	no	grav.	126	1948
" " "	"	yes	grav.	315	1948
" " "	"	N	N	N	1949
" " "	"	no	grav.	193	1949
" " "	"	no	grav.	252	1949
" " "	"	no	grav.	126	1949
" " "	"	no	grav.	252	1949
Stanolind Oil & Gas Co.	Turtle Bay	no	grav.	134	1950
Sun Oil Co.	Anahuac	yes	grav.	2	1947
" "	Oyster Bayou	N	N	N	1950
The Texas Co.	Fig Ridge	no	pres.	3	1947
CLAY					
Benbrook Oil Co.	Lazy "B"	no	pres.	8	1950
Gulf Oil Corp.	Lazy "B"	no	pres.	N	1950
Magnolia Pet. Co.	Joy Strawn	no	grav.	2	1950
Phillips Pet. Co	Bryant-Simpson	no	pres.	19	1949
Skelly Oil Co	Lazy "B"	yes	pres.	2	1950
Shell Oil Co.	Joy Strawn	no	grav.	11	1951
COOKE					
Kimble and Sims	Woodbine	no	pres.	5	1949
Phillips Pet. Co.	Dangle	no	grav.	21	1949
Star Oil Co.	Woodbine	no	grav.	3	1948
GALVESTON					
Phillips Pet. Co.	League City	no	grav.	231	1951
Stanolind Oil & Gas Co.	Hastings	N	N	N	1950
HARRIS					
J. S. Abercrombie Co.	Pierce Junction	yes	grav.	38	1947
Amerada Pet. Corp.	Satsuma	no	pres.	67	1951
A. W. Crosby, Inc.	Humble	no	pres.	7	1951
Eltex, Ltd.	Spring	no	grav.	N	1948
General Crude	Joyce-Richardson	no	pres.	N	1949
Humble Oil & Ref. Co.	Clear Lake	no	grav.	210	1947
" " "	Tomball	yes	grav.pres.	378	1948
" " "	Humble	no	grav.	50	1949
" " "	New Delhi	no	pres.	17	1950
" " "	Webster	yes	grav.	158	1951
Lucerre Corp.	Dyersdale	no	grav.	252	1949
Mabee Pet. Co.	Tomball	no	grav.	2	1950
Albert Plummer	Pierce Junction	no	grav.	25	1950
Shell Oil Co.	Tomball	no	grav.pres.	84	1949
The Texas Co.	Humble	yes	pres.	50	1951
Tidewater Assoc.	Dyersdale	N	N	N	1949
Union Producing Co.	Fairbank	yes	pres.	6	1947

HOUSTON					
Lone Star Producing Co.	Grapeland	no	pres.	42	1950
JACK					
Mid-Continent Pet. Corp.	Campsey-Ellenberger	no	grav.pres.	13	1950
" " "	Post Oak-Ellenberger	no	grav.	10	1950
" " "	Cundiff	no	pres.	17	1950
Shell Oil Co.	Lester	no	grav.	19	1949
Warren Oil Corp.	Gresham-Ellenberger	no	pres.	2	1950
LIBERTY					
General Crude	Kirby	no	grav.	38	1949
" "	Esperson Dome	no	grav.	42	1951
" "	Kirby	yes	grav.	21	1951
Gulf Oil Corp.	South Liberty	no	grav.	21	1951
Humble Oil & Ref. Co.	Hardin	no	grav.	59	1947
" " "	"	no	grav.	118	1947
Noble and Baker	South Liberty	no	grav.	21	1951
LIMESTONE					
Pure Oil Co.	Mexia	no	grav.	210	1947
MADISON					
The Texas Co.	Sam Larry	no	pres.	8	1951
MONTAGUE					
Cason Oil Co.	South Bowers	no	grav.	5	1949
Continental Oil Co.	Hildreth	yes	grav.	11	1949
" "	Hundley	yes	pres.	8	1950
" "	Chapman-McFarlin	no	pres.	13	1950
" "	West Bowie	no	pres.	8	1951
Conrad Stykgold	West Minor	no	pres.	11	1951
MONTGOMERY					
H. E. Hines	Conroe	no	grav.	N	1948
Humble Oil & Ref. Co.	"	no	grav.	264	1947
" " "	"	no	grav.	407	1947
" " "	"	no	grav.	483	1948
" " "	"	no	grav.	302	1948
" " "	"	no	grav.	349	1948
" " "	"	N	grav.	N	1949
" " "	"	no	grav.	357	1949
" " "	"	no	grav.	N	1949
" " "	"	yes	grav.	168	1951
" " "	"	yes	grav.	168	1951
" " "	"	yes	grav.	147	1951
" " "	"	yes	grav.	118	1951
Shell Oil Co.	"	no	grav.	21	1948
" "	"	no	grav.	21	1948
Showers and Moncrief	"	no	pres.	1	1948
POLK	"				
Humble Oil & Ref. Co.	Livingston	no	grav.	252	1947
" " "	"	no	grav.	210	1948
Shell Oil Co.	"	yes	grav.	42	1950
Sun Oil Co.	"	no	grav.	38	1949

WALLER					
Humble Oil & Ref. Co.	Katy	N	N	193	1949
YOUNG					
Hanlon-Bayle, Inc.	Warren Strawn	no	grav.	2	1949
" "	" "	no	grav.	2	1949
Warren Oil Corp.	" "	no	pres.	4	1949
" "	Burns-Ragland	N	N	N	1949

The following injection wells are located in "County Regular" fields

ARCHER					
C. T. Anderson		yes	N	1	1950
P. Atchley & Son		no	grav.	1	1950
D. H. Bolin		no	grav.	4	1950
Cable Oil Co.		no	pres.	2	1947
R. C. Dublin		N	N	6	1950
Fortex Oil Corp.		yes	pres.	4	1949
" "		yes	pres.	4	1949
G. W. Graham		yes	pres.	1	1950
Gulf Oil Corp.		no	grav.	5	1948
" "		no	grav.	N	1948
" "		no	grav.	N	1948
" "		no	grav.	2	1948
" "		no	grav.	3	1950
" "		no	grav.	3	1951
C. T. Hedfes		no	grav.	4	1950
A. A. Howitz		no	pres.	2	1949
T. F. Hunter		no	grav.	4	1948
" " "		no	pres.	21	1951
R. A. King & Sons		yes	pres.	1	1950
J. A. Lamar		no	grav.	2	1950
Magnolia Pet. Co.		no	grav.	2	1951
F. M. Manninglue		yes	pres.	6	1947
C. V. Morgan		no	grav.	2	1947
" " "		no	grav	3	1947
" " "		no	grav.	7	1947
" " "		no	grav.	2	1947
Phillips Pet.Co.		no	grav.	11	1948
" "		no	grav.	13	1949
" "		no	grav.	13	1949
Producers Development Co.		yes	grav.	4	1949
Shell Oil Co., Inc.		no	grav.	N	1949
O. C. Sherley		no	grav.	5	1949
Reno Oil Co.		no	pres.	none	1947
The Texas Co.		no	grav.	1	1947
" "		no	grav.	1	1947
" "		no	grav.	3	1947
" "		no	grav.	1	1947
" "		no	grav.	5	1948
" "		no	pres.	4	1951
Underwood Drilling Co.		N	N	4	1950
E. W Whitaker		no	pres.	4	1949
W. C. Young		N	N	N	1949

CLAY				
Gulf Oil Corp.	no	pres.	3	1948
" "	no	pres.	3	1948
Magnolia Pet. Co.	no	grav.	2	1947
COOKE				
Kewanee Oil Co.	no	grav.	8	1949
" "	no	grav.	5	1949
Ford Snuggs	no	grav.	1	1947
The Texas Co.	no	grav.	5	1948
" "	yes	grav.	3	1949
MONTAGUE				
Bridwell Oil Co.	N	N	2	1947
" "	N	N	13	1947
" "	N	pres.	10	1947
Continental Oil Co.	yes	grav.	4	1951
" "	yes	grav.	4	1951
" "	yes	grav.	5	1951
" "	yes	grav.	4	1951
Pure Oil Co.	yes	grav.	8	1947
" "	yes	grav.	1	1948
The Texas Co.	no	grav.	1	1947
" "	no	grav.	3	1947
" "	no	grav.	11	1947
" "	yes	grav.	2	1950
YOUNG				
British-American Oil Co.	no	pres.	1	1951
B-D-T Oil Co.	no	grav.	4	1951
Walter Grammer	no	grav.	3	1949
J. W. Harvey	N	N	1	1950
Hunter Bros.	yes	pres.	8	1949
F. M. Manning	no	grav.	N	1950
Mid-Continent Pet. Corp.	no	grav.	5	1951
Sinclair-Prairie	no	grav.	12	1947
Texmas Pet. Co.	no	pres.	N	1949
The Texas Co.	no	grav.	1	1947
Texas Consolidated Oils	no	pres.	17	1950
Warren Oil Corp.	no	pres.	3	1949
West & Honea	yes	N	N	1947
" "	yes	N	N	1947

APPENDIX "C"

Population Trends and Distribution

Community	County	1940 Census	1950 Census
Alvin	Brazoria	3,087	3,541
Athens	Navarro	4,765	5,206
Arlington	Tarrant	4,240	7,686
Baytown	Harris	16,641	22,927
Bowie	Montague	3,470	4,530
Conroe	Montgomery	4,624	7,313
Corsicana	Navarro	15,232	19,108
Crockett	Houston	4,536	5,923
Dallas	Dallas	294,734	432,927
Decatur	Wise	2,578	2,925
Denton	Denton	11,192	21,345
Ennis	Ellis	7,087	7,817
Fort Worth	Tarrant	177,662	277,047
Gainesville	Cooke	9,651	11,219
Galveston	Galveston	60,862	65,898
Garland	Dallas	2,233	10,291
Grand Prairie	Dallas	1,595	14,707
Highland Park	Dallas	10,288	11,307
Highlands	Harris	3,000	2,715
Houston	Harris	384,514	594,321
Huntsville	Walker	5,108	9,802
Kaufman	Kaufman	2,654	2,715
La Porte	Harris	3,072	4,957
Liberty	Liberty	3,087	4,161
McKinney	Collin	8,555	10,525
Mexia	Limestone	6,410	6,618
Palestine	Anderson	12,144	12,455
Pasadena	Harris	3,436	22,444
Teague	Freestone	3,157	2,908
Terrell	Kaufman	10,481	11,553
Texas City	Galveston	5,748	16,577
University Park	Dallas	14,458	23,823
Waxahachie	Ellis	8,655	11,196
Weatherford	Parker	5,924	8,053

POPULATION TRENDS AND DISTRIBUTION—TRINITY RIVER BASIN

Area and County	Population in Basin			Percent Increase		1950 Population	
	1930	1940	1950	1940 over 1930	1950 over 1940	Urban	Rural
Upper Area							
Archer	440	345	310	-22	-10		310
Young	839	792	698	- 6	-13		698
Clay	1,726	1,487	1,171	-14	-21		1,171
Jack	6,612	7,460	5,637	13	-24		5,637
Montague	9,593	10,235	8,512	7	-17	4,530	3,982
Wise	19,178	19,074	16,092	- 1	-15	2,925	13,167
Parker	12,510	13,655	14,324	9	5	8,053	6,271
Cooke	19,635	20,263	17,944	3	-11	11,219	6,725
Denton	32,822	33,658	41,243	3	22	21,345	19,898
Tarrant	197,553	225,521	353,846	14	57	301,309	52,537
Johnson	12,874	11,740	12,020	- 9	2		12,020
Grayson	15,592	16,459	16,605	6	1		16,605
Collin	43,511	44,463	39,097	2	-12	10,525	28,572
Dallas	325,691	394,564	610,852	21	55	477,647	133,205
Fannin	3,548	3,538	2,685	0	-24		2,685
Hunt	412	410	358	0	-12		358
Rockwall	4,640	4,272	3,706	- 8	-17		3,706
Ellis	53,936	47,733	45,517	-12	- 5	19,013	26,504
Kaufman	40,643	38,061	30,918	- 6	-19	14,268	16,650
Van Zandt	5,830	5,620	4,068	- 4	-28		4,068
	807,585	899,350	1,225,603	11	36	870,834	354,769
Center Area							
Hill	14,180	12,637	10,267	-11	-19		10,265
Navarro	60,507	51,308	39,731	-15	-23	19,108	20,623
Henderson	19,958	20,764	15,225	4	-25	5,206	10,019
Limestone	12,209	10,442	7,762	-14	-26	6,618	1,114
Freestone	21,482	20,103	14,877	-6	-26	2,908	11,969
Anderson	23,058	24,686	21,132	1	-14	12,455	8,677
Leon	14,810	13,198	8,923	-11	-40		8,923
Houston	21,450	22,248	19,827	4	-11	5,925	13,904
Madison	11,048	10,870	7,198	- 2	-34		7,189
Trinity	9,416	9,462	6,914	1	-27		6,914
	208,118	195,718	151,817	- 6	-22	52,220	99,597

Area and County	Population in Basin			Percent Increase		1950 Population	
	1930	1940	1950	1940 over 1930	1950 over 1940	Urban	Rural
Lower Area							
Grimes	9,206	8,930	6,074	- 3	-32		6,074
Walker	18,528	19,868	20,168	7	2	9,802	10,366
San Jacinto	9,711	9,056	7,162	- 7	-21		7,162
Polk	9,759	11,470	8,983	18	-22	2,855	6,128
Hardin	160	189	232	18	23		232
Liberty	13,691	16,909	18,389	23	9	9,355	9,034
Montgomery	14,588	23,055	24,440	58	6	7,313	17,127
Waller	3,359	3,448	4,004	3	16		4,004
Harris	359,328	528,961	802,102	47	52	689,975	112,127
Chambers	3,215	4,229	4,416	30	5		4,416
Fort Bend	3,073	3,409	3,144	11	- 8		3,144
Galveston	64,410	81,173	112,226	26	38	82,475	29,751
Brazoria	5,980	7,022	12,040	17	71	3,541	8,499
	514,999	717,719	1,023,380	39	44	805,316	218,064
Basin Total	1,530,702	1,812,787	2,400,837	18	32	1,728,370	672,430

Distribution of the 1950 population in the three areas:

	Percent of Area	Percent of Population	Urban-Rural Ratio
Upper Area	42	51	2.4 : 1.0
Center Area	25	6	1.0 : 1.9
Lower Area	33	43	3.7 : 1.0

APPENDIX "D"

PRODUCTS MANUFACTURED

Brewing and Distilling Industry - Ales, beers and yeast.

Canning Industry - Fruits, jams, jellies, vegetables and sea foods.

Chemical Industry - Acetone, acetylene, acetic acid, acids, alcohols, alum, ammonia, antiseptics, asphalt, bleach, carbonic acid, carbon black, caulking compounds, household and sanitary chemicals, industrial chemicals chlorine, coatings, cosmetics, cotton seed oil and products, creosoted products, detergents, disinfectants and germicides, driers, drugs and medicines, dyes, enamels, fertilizers, fire works, flavors and flavoring, food colors, fumigants, glues, gypsum products, helium, hydrogen, hydrochloric acid, ink, insecticides, lacquer, lime, nitrogen, oil well muds, oxygen, paints, plastics, poisons, polishes, preservatives, resins, synthetic rubber, salt cake, soap, soda and soda ash, solvents, styrene, sulphur compounds, sulphuric acid, toiletries, turpentine, varnish, waterproofing compounds, waxes, weed killers.

Food Processing Industry - Bakery products, beverage, candies, cooking oils, cereals, dehydrated foods, egg products, flour and grain products, food specialties, gelatin, macaroni, spaghetti, noodles, mexican foods, oleomargarine, olive products, peanut products, pecan products, rice and rice products, seasoning and condiments, syrups and extracts, teas and coffees, vinegar.

Leather Industry - Bags, belts, leather, luggage, purses, saddles, shoes and boots.

Lumber Industry - Barrels, baskets, boxes, crates, cases, cabinets and show cases, furniture, lumber and lumber products, mill work, plywood, structural timber, veneer.

Meat Packing Industry - Meats, poultry and sea food.

Metal Industry - Air conditioning equipment, alloys, aluminum products, anchors, barrels and drums, baskets, bearings, bed springs, boilers, burners and furnaces, cabinets and furniture, cans and containers, ferrous and non ferrous castings, copper products, electrical equipment, electroplating work, diesel and gasoline engines, fence and fencing, games and toys, prefabricated buildings, iron and steel fabrication, lead and lead products, machinery of all kinds, electrical and water meters, motors and generators, pipe and fittings, ships and barges, oil well rigs, tanks, tin and tin products, tools and equipment, trailers and truck bodies, valves, wire and wire products.

Milk and Dairy Industry - Butter, cheese, condensed milk, evaporated and powdered milk, ice cream, sherberts.

Mining Industry - Bentonite, bleaching clay, fire clay, fullers earth, gypsum, silica sand, sulphur.

Petroleum Industry - Asphalt, butane, gas, gasoline, grease, kerosene, fuel and lubricating oil, propane and other petroleum products.

Pulp and Paper Industry - Paper board, carbon paper, sand paper, wall paper, paper products such as bags, boxes, envelopes, stationery.

Textile Industry - Bags, bedding, cotton cloth and canvas, clothing of all kinds, mattresses, yarn.

Miscellaneous Industry - Automobiles, busses, trucks, brick and tile, brooms, cement, concrete products, cotton ginning, ice, jewelry, musical instruments.

APPENDIX "E"

TRINITY RIVER SUB-BASIN

WATER SUPPLIES

Municipality or Owner	Water Use	Population Served	Source of Supply	Acre Feet		Ave. Use Gallons Per Day
				Storage	Granted	
Aledo	Mun.	--	Ground			--
Allen	Mun.	500	Ground			35,000
Alvarado	Mun.	2,000	Trinity Sand			170,000
Alvin	Mun.	2,460	Various Sands			300,000
Alvord	Mun.	500	Ground			70,000
Anahuac	Mun.	1,600	Various Sands			150,000
Anna	Mun.	450	Woodbine Sand			35,000
Arlington	Mun.	10,000	Trinity Sand			1,500,000
Athens	Mun.	8,500	Wilcox Sand			600,000
Aubrey	Mun.	600	Ground			25,000
Avalon	Mun.	140	Ground			--
Bardwell	Mun.	300	Ground			21,000
Barry	Mun.	200	Woodbine Sand			14,000
Baytown	Mun.	26,000	Various Sands			640,000
Bedias	Mun.	450	Yegua Formation			20,000
Bellaire	Mun.	12,000	Various Sands			1,000,000
Blooming Grove	Mun.	830	Woodbine Sand			60,000
Blue Ridge	Mun.	450	Woodbine Sand			32,000
Bowie	Mun.	4,500	Lake Bowie			500,000
Boyce	Mun.	250	Ground			--
Boyd	Mun.	500	Ground			70,000
Brandon	Mun.	200	Woodbine Sand			5,000
Bridgeport	Mun.	2,000	West Fork Trinity	--	--	110,000
Buffalo	Mun.	1,000	Wilcox Sand			75,000
Burleson	Mun.	570	Trinity Sand			75,000
Bynum	Mun.	300	Woodbine Sand			20,000
Carrollton	Mun.	1,100	Woodbine Sand			77,000
Cedar Hill	Mun.	800	Ground			56,000
Celina	Mun.	1,200	Paluxy & Woodbine Sands			80,000
Centerville	Mun.	900	Queen City Sand			45,000
Channelview	Mun.	700	Ground			500,000
Cleveland	Mun.	6,000	Lagarto Clay			200,000
Coldspring	Mun.	300	Spring			2,500
Collinsville	Mun.	600	Paluxy Sand			50,000
Conroe	Mun.	6,000	Oakville Sandstone			550,000
Coolidge	Mun.	1,100	Small Lakes			110,000
Corsicana	Mun.	18,500	Lake Halbert on Elm Creek	--	--	1,800,000
Crandall	Mun.	700	Woodbine Sand			50,000
Crockett	Mun.	6,500	Sparta Sand			700,000
Crosby	Mun.	1,000	Various Sands			30,000

Municipality or Owner	Water Use	Population Served	Source of Supply	Acre Feet Storage	Acre Feet Granted	Ave. Use Gallons Per Day
Dallas	(Mun.	400,000	(Trinity Sand&			60,000,000
	(Ind.		(Lake Dallas	1,113,000	800,000	
Dawson	Mun.	1,200	Surface Reservoir	--	--	80,000
Dayton	Mun.	1,280	Various Sands			180,000
Decatur	Mun.	2,500	Trinity Sands			200,000
Deer Park	Mun.	500	Ground			--
Denton	Mun.	26,000	Trinity Sand			2,000,000
Dickinson	Mun.	1,000	Various Sands			17,000
Duncanville	Mun.	1,200	Ground			--
Elkhart	Mun.	700	Carrizo Sand			50,000
Ennis	Mun.	9,500	Woodbine Sand			
			Little Mustang	952	450	670,000
Eustace	Mun.	400	Wilcox			28,000
Everman	Mun.	200	Trinity Sand			10,000
Fairfield	Mun.	1,675	Wilcox Sand			117,000
Farmersville	Mun.	2,210	Lake on Elm Creek	200	67	150,000
Ferris	Mun.	2,000	Woodbine Sand			140,000
Forney	Mun.	1,100	Woodbine Sand			70,000
Forest Hills	Mun.	3,600	Ground			216,000
Foreston	Mun.	325	Woodbine Sand			--
Fort Worth	(Mun.	350,000	Lake Worth, Eagle	400,000	262,000	30,000,000
	(Ind.		Mountain Lake,			
	(Irr.		Bridgeport Lake,			
	(Rec.		West Fork Trinity			
Fostoria	Mun.	900	Oakville Sandstone			30,000
Frisco	Mun.	800	Paluxy Sand			50,000
Frost	Mun.	650	Woodbine Sand			45,000
Gainesville	Mun.	12,000	Trinity Sand			1,500,000
Galena Park	Mun.	7,000	Ground			500,000
Galveston	Mun.	85,000	Various Sands			10,000,000
Garland	Mun.	8,000	Trinity & Woodbine Sands			700,000
Goodrich	Mun.	200	Lagarto Clay			12,000
Grand Prairie	Mun.	16,000	Woodbine Sand			1,200,000
Grandview	Mun.	850	Woodbine Sand			50,000
Grapeland	Mun.	1,030	Carrizo Sand			75,000
Grapevine	Mun.	2,000	Ground			200,000
Groveton	Mun.	1,000	Jackson Formation			70,000
Gunter	Mun.	400	Woodbine Sand			50,000
Handley	Mun.	5,000	Trinity Sand			500,000
Highlands	Mun.	2,400	Various Sands			120,000
Hitchcock	Mun.	400	Ground			--
Houston	(Mun.	520,000	Various Sands			61,000,000
	(Ind.					
Howe	Mun.	500	Woodbine Sand			35,000
Hubbard	Mun.	2,000	Surface Reservoirs	--	--	150,000
Hufsmith	Mun.	250	Ground			--

Municipality or Owner	Water Use	Population Served	Source of Supply	Acre Feet Storage	Acre Feet Granted	Ave. Use Gallons Per Day
Humble	Mun.	2,500	Various Sands			160,000
Huntsville	Mun.	5,500	Catahoula Sandstone			700,000
Iola	Mun.	400	Yegua Formation			20,000
Irene	Mun.	275	Woodbine Sand			10,000
Irving	Mun.	6,000	Woodbine Sand			450,000
Italy	Mun.	1,500	Woodbine Sand			110,000
Jacinto City	Mun.	8,000	Ground			500,000
Jacksboro	Mun.	2,800	Canyon Sand			250,000
Jewett	Mun.	600	Carrizo Sand			30,000
Joshua	Mun.	800	Trinity Sand			30,000
Justin	Mun.	700	Ground			20,000
Kaufman	Mun.	2,600	Surface Reservoirs	--	--	200,000
Katy	Mun.	500	Ground			--
Keene	Mun.	450	Ground			30,000
Keller	Mun.	500	Ground			20,000
Kemah	Mun.	600	Various Sands			40,000
Kemp	Mun.	1,200	Lake			84,000
Kerens	Mun.	1,950	Cow Creek			140,000
Krum	Mun.	500	Ground			20,000
LaMarque	Mun.	8,500	Various Sands			400,000
Lancaster	Mun.	2,500	Woodbine Sand			175,000
LaPorte	Mun.	6,000	Various Sands			220,000
League City	Mun.	1,200	Ground			40,000
Leggett	Mun.	300	Ground			--
Leonard	Mun.	1,800	Woodbine Sand			130,000
Lewisville	Mun.	875	Ground			100,000
Liberty	Mun.	5,500	Various Sands			750,000
Livingston	Mun.	2,500	Lagarto Clay			400,000
Lovelady	Mun.	540	Yegua Formation			10,000
Mabank	Mun.	1,200	Reservoir on Twin Creek	--	--	65,000
McKinney	Mun.	13,500	Trinity & Woodbine Sands			1,000,000
Madisonville	Mun.	2,700	Yegua Formation			160,000
Malakoff	Mun.	1,500	Wilcox Sand			100,000
Malone	Mun.	430	Trinity Sand			--
Mansfield	Mun.	1,000	Woodbine Sand			80,000
Maypearl	Mun.	500	Ground			35,000
Melissa	Mun.	500	Woodbine Sand			35,000
Mertens	Mun.	270	Woodbine Sand			13,000
Mesquite	Mun.	2,000	Woodbine Sand			140,000
Mexia	Mun.	7,500	Ground			1,130,000
Medlothian	Mun.	1,800	Trinity & Woodbine Sands			126,000
Midway	Mun.	240	Yegua Formation			12,000
Milford	Mun.	1,800	Trinity & Woodbine Sands			50,000
Mont Belview	Mun.	900	Various Sands			90,000
Montgomery	Mun.	360	Lagarto Clay & Oakville Sandstone			30,000
Muenster	Mun.	850	Trinity Sand			60,000

Municipality or Owner	Water Use	Population Served	Sources of Supply	Acre Feet		Ave. Use Gallons Per Day
				Storage	: Granted	
New Willard	Mun.	500	Lagarto Clay or Oakville Sandstone			--
Onalaska	Mun.	100	Ground			3,000
Palestine	Mun.	16,000	Wilcox Sand and Wolf Creek			1,200,000
Palmer	Mun.	800	Woodbine Sand			56,000
Paradise	Mun.	120	Ground			5,000
Pasadena	Mun.	25,000	Various Sands			1,250,000
Peaster	Mun.	--	Ground			--
Pilot Point	Mun.	1,600	Ground			180,000
Plano	Mun.	1,500	Ground			100,000
Plantersville	Mun.	100	Ground			40,000
Ponder	Mun.	200	Ground			5,000
Poolville	Mun.	--	Ground			--
Princeton	Mun.	500	Woodbine Sand			40,000
Prosper	Mun.	400	Woodbine Sand			30,000
Red Oak	Mun.	240	Woodbine Sand			--
Rhome	Mun.	500	Ground			15,000
Richardson	Mun.	800	Woodbine Sand			60,000
Roanoke	Mun.	600	Ground			30,000
Rockwall	Mun.	2,000	Paluxy & Woodbine Sands			140,000
Saginaw	Mun.	500	Ground			40,000
Saint Jo	Mun.	1,500	Trinity Sand			120,000
Sanger	Mun.	1,500	Ground			100,000
Seagoville	Mun.	1,900	Woodbine Sand			130,000
Shiro	Mun.	250	Catahoula Sandstone			5,000
South Houston	Mun.	4,600	Ground			165,000
Spring	Mun.	500	Ground			20,000
Springtown	Mun.	--	Ground			--
Streetman	Mun.	400	Two Small Reservoirs	--	--	30,000
Sunset	Mun.	630	Ground			--
Teague	(Mun.	3,600	Two Reservoirs	1,000	--	250,000
	(Ind.	--				160,000
Tehuacana	Mun.	380	Ground			9,000
Terrell	Mun.	10,000	Lake	1,500	--	700,000
Texas City	Mun.	35,000	Various Sands			1,100,000
Texas City Hts.	Mun.	1,600	Ground			120,000
Tioga	Mun.	700	Ground			50,000
Tomball	(Mun.	1,500	Various Sands			70,000
	(Ind.	--	Various Sands			95,000
Trenton	Mun.	600	Woodbine Sand			27,000
Trinidad	Mun.	400	Wilcox Sand			40,000
Trinity	Mun.	2,500	Jackson Formation			325,000
Valley View	Mun.	400	Trinity Sand			50,000
Van Alstyne	Mun.	2,100	Woodbine Sand			150,000
Venus	Mun.	350	Ground			15,000
Waxahachie	Mun.	9,200	Trinity and Woodbine Sands			460,000
Weatherford	Mun.	5,900	Trinity Sand			300,000

Municipality or Owner	Water Use	Population Served	Source of Supply	Acre Feet Storage	Acre Feet Granted	Ave. Use Gallons Per Day
Webster	Mun.	200	Ground			-- --
W. University Place	Mun.	15,000	Ground			2,100,000
Whitesboro	Mun.	2,800	Trinity Sand			200,000
White Settlement	Mun.	4,200	Ground			240,000
Willis	Mun.	500	Lagarto Clay & Oakville Sandstone			60,000
Wilmer	Mun.	750	Ground			--
Wortham	Mun.	1,600	Small Reservoirs	1,800	--	110,000
Wylie	Mun.	1,800	Woodbine Sand			130,000
Tarrant County WCID#1	(Mun. (Rec.		West Fork Trinity	290,000	52,000	--
Earl H. Doan	Irr.		West Fork Trinity	--	16	--
River Crest Country Club	Irr.		Surface Supply	--	210	175,000
Julian R. Meeker	Irr.		West Fork Trinity	--	97	7,000
Morris E. Berney	Irr.		West Fork Trinity	--	29	5,000
Texas Electric Service Co.	Irr.		Trinity River	150	--	--
Jim George	--		Trinity River	74	--	17,000
Proctor & Gamble Co.	Ind.		Trinity River	--	2,250	none
Mrs. Jessie E. Embry	Irr.		Honey Spring Creek	--	154	4,000
Texas Power & Light Co.	Irr.		Trinity River	6,240	4,000	240,000
Richmond Irrigation Co.	Irr.		Trinity River	--	--	18,000,000
Devers Canal Co.	Irr.		Trinity River	7,500	58,500	91,000,000
Chambers - Liberty Navigation Co.	Irr.		Turtle Bayou & Lee's Gully	18,000	800	700,000
Trinity River Irrigation Dist.	Irr.		Trinity River	--	--	
Roy Cherry Homes	Flood Con.		Howard Creek	206	--	--
Tex. Pac. RR	Ind.		Clear Fork	314	167	1,370,000
Tex. Pac. RR	Ind.		Big Elm Creek	--	833	75,000
Tex. Pac. RR	Ind.		Creek of East Fork	184	256	23,000
E. G. Rall	Irr.		Clear Fork	115	500	none
Dallas Power & Light Co.	Ind.		Mountain Creek	40,000	15,000	no consumption
Walter Stephenson	Ind.		Cottonwood Creek	--	--	14,000
Paul Arendt	Irr.		Elm Creek	--	42	none

Municipality or Owner	Water Use	Population Served	Source of Supply	Acre Feet		Ave. Use Gallons Per Day
				Storage	Granted	
Ethel Breeding	Irr.		Pecan Creek	--	30	none
Mabel B. Johnson	Irr.		Pecan Creek	5	34	--
Tom R. Hickman	Irr.		Elm Creek	--	20	none
Jobson C. Dunn	Irr.		Denton Creek	660	--	--
Alexander Deussen	Irr.		Denton Creek	19	110	21,000
Dallas WC&ID#2	(Mun. (Ind.		Denton Creek & Elm Fork	434,200	50,000	see Dallas
Realty Dev. Co.	Irr.		Floy's Branch	14	141	32,000
M.K.&T. RR Co.	Ind.		Unnamed	135	--	9,500
M.K.&T. RR Co.	Ind.		East Fork	94	--	--
Mrs. T. C. Lupton	Stock		Twin Creek	97	40	--
C. L. & Mayme S. Penn	Irr.		E. Fk. of Trinity R.	--	800	--
Texas Pipeline Co.	Ind.		Mesquite Creek	--	40	11,000
Texas Game & Fish Comm.	Hatchery		Harmon Creek	51	1,200	1,030,000
Texas Co.	Ind.		Bethea Creek	6	--	25,000
C. M. Griswold	Stock		Tanta Bayou	109	109	--
Texas Gulf Prod. Co.	Ind.		Old River	--	60	61,000
Southern Canal Co.	Irr. & Mining		Trinity River	--	--	52,500,000

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